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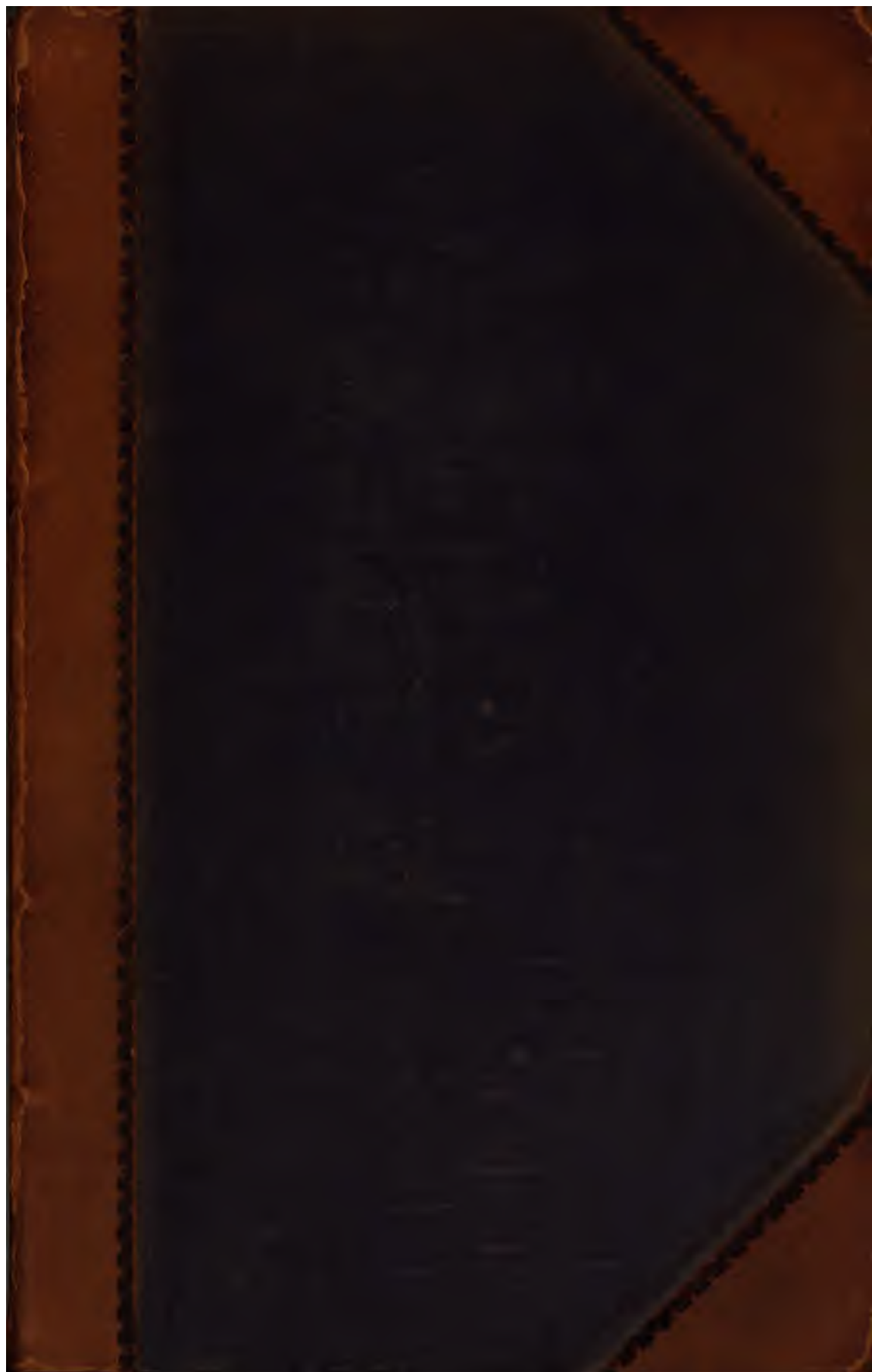
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E. BIBL. RADCL

*Prof. Per. VI*

*Soe 1891 d 62*



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PROCEEDINGS

OF THE

ACADEMY OF NATURAL SCIENCES

OF

PHILADELPHIA.

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1865.

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1865.





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*January 3d.*

MR. JOSEPH JEANES in the Chair.

Thirteen members present.

The following paper was presented for publication and referred to a committee:

"On extreme and exceptional variations of species of Diatomaceæ, etc." By F. W. Lewis, M. D.

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*January 10th.*

The President, DR. BRIDGES, in the Chair.

Twelve members present.

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*January 17th.*

The President, DR. BRIDGES, in the Chair.

Fifteen members present.

The following paper was presented and referred to a committee:

"Remarks on the genera *Semicossyphus* and *Trochocopus*." By Dr. A. Günther.

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*January 24th.*

The President, DR. BRIDGES, in the Chair.

Ten members present.

The following paper was presented and referred to a committee:

"Synopsis of the *Streptomatidæ*, &c., Part IV." By George W. Tryon, Jr.

The Secretary announced the recent death of Dr. R. M. S. Jackson, late a Correspondent of this Academy.

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E. BIBL. RADCL

*Prof. Per. VI*

*Soe 1891. d 62*



January 31st.

The President, DR. BRIDGES, in the Chair.

— members present.

On report of the respective Committees, the following papers were ordered to be published :

## Notes on some new and little known Rapacious BIRDS.

BY JOHN CASSIN.

## 1. POLYBORUS AUDUBONII, nobis.

*Polyborus vulgaris* (Vieill.), Aud., Orn. Biog., ii. p. 350 (1834).*Polyborus brasiliensis* (Gm.), Aud., B. of Am., Oct. ed. i. p. 21 (1840).*Polyborus tharus* (Mol.), Cass., B. of Cal. and Texas, i. p. 113.

Aud., B. of Am., pl. 161; Oct. ed., i. pl. 4.

Back and rump brownish black in all ages and stages of plumage, (not transversely banded as in *P. tharus*.) Under tail coverts white, nearly pure, or with a few indistinct traces of dark transverse bands on the longer feathers. In all other respects very similar to *P. tharus* of Chili and other countries on the Pacific coast of South America. In *P. tharus* the back and rump are transversely banded with brownish black and white, in all ages, and the under tail coverts are white, with well defined transverse narrow bands of dark brown. In size, the present bird seems to be rather the larger.

The specimen now described is Mr. Audubon's type from Florida, presented by him to this Academy, and is very accurately given in the plates above cited, the upper figures in which represent the black upper parts as above described. In his descriptions, he says "*cere carmine*," which color is also given in his plates; but in the South American species, seen in abundance in Patagonia by Dr. Charles Pickering, during the voyage of the United States Exploring Expedition in the Vincennes and Peacock, that distinguished naturalist says explicitly, "The skin about the bill has not the bright red color as given in Mr. Audubon's figure from a Florida specimen." (Mamm. and Orn. U. S. Expl. Exp., p. 100.) This difference in the color of the *cere* may be characteristic, though more probably, in my opinion, it is dependent on season only, the brighter or red color being that accompanying the more mature or nuptial plumage, which is the case in the Rasorial or Gallinaceous birds, and analogous groups throughout the circle of Birds. Numerous specimens of this species, from Texas and Mexico, are in the collection of the Smithsonian Institution.

## 2. SPILORNIS BACHA, (Daudin.)

*Falco Bacha*, Daud., Traité d'Orn., ii. p. 43 (1800).*Spilornis Bacha*, (Daud.) Cass., Proc. Acad. Philada., 1859, p. 31.

Le Vaill., Ois. d'Afr., i. pl. 5.

In a Catalogue of birds collected by Mr. DuChaillu in the countries on the Camma and Ogobai Rivers, Western Africa, printed in the Proceedings of the Academy, as above cited, I applied the name *Spilornis Bacha* to a species, one specimen of which was in that collection and is now in the Academy Museum. This specimen is evidently that of a young bird bearing little resemblance in colors to the adult, and I have seen no other of the same species from Western Africa. In the statement in the Catalogue alluded to, that this species is "quite identical with the *Bacha* of Southern Africa, of which a very complete series is in the Academy Museum," I may have been mistaken in relying on such specimens as being from that continent. I do not know, however, that such is certainly the case; the specimen now before me from Western Africa so nearly resembling other young birds in the Academy Museum, un-

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doubtedly the species usually regarded as *S. Bacha*, and variously labelled as Asiatic and African, that I am not quite sure that *Bacha* is not an African species, whatever else may have been advanced in any other behalf.

There are in the Academy Museum, several specimens of the bird usually regarded as *F. bacha*, which have been labelled in Europe as from South Africa. If I committed an error, it was not because I relied on those labels, of the authority of which I know nothing, nor can now discover anything, but that I took them only as confirmatory of an impression that *F. bacha* was an African as well as Asiatic species. If in error, I was directly misled by the statement of that great naturalist, Temminck, in Pl. Col., i. liv. iv., to this effect: "La Buse bacha, *Falco bacha*, des catalogues méthodiques, est répandue non-seulement dans l'Afrique méridionale, mais on la trouve aussi dans l'Inde, à Java et à Sumatra." Statements of a similar import I have seen elsewhere. It is, of course, possible, that Temminck and others may have relied solely on Le Vaillant without other information.

But, notwithstanding the impeachment of the veracity of Le Vaillant, and the opinions on that point that have, in some instances, been freely expressed, and seem to be rather fashionable, I shall not admit, I beg to say, either that *Spilornis Bacha* is not an African bird, or that Le Vaillant's account of the species to which he applied the name *Bacha* is not reliable, without further occasion. Those opinions I do by no means participate in nor approve, and instances of the expression of such have occurred, which present themselves to me in no other aspect than that of unqualified impertinence, and as demonstrative not only of deficient information on the part of the writers, but of a disposition to seek a short and easy road to notoriety by rude assaults on the reputation of a great practical, and most useful naturalist, whose only faults were an enthusiastic devotion to Natural History, and failure to elicit the appreciation of men of dissimilar temperament and greater stolidity of ambition. The fair fame of Le Vaillant has passed the ordeal of one-half century productive of great naturalists, and its impeachment will not, I suspect, blazon the reputation of any one likely to be such in the present cycle of similar period!

There are now before me, a series of fourteen specimens of the bird purporting to be *F. Bacha*, from the Academy Museum, about half of which are in various stages of young plumage, and of the whole of which scarcely any two are precisely alike in colors. One stage of young plumage is undoubtedly that given by Temminck, under the name "*Falco albidus*, Cuv.," in Pl. Col., 19. As stated above, a few of these specimens have been labelled in Europe as coming from "South Africa," of the validity of which locality I know nothing. Other specimens are undoubtedly Asiatic, and, though differing from each other in some particulars of character, and, perhaps, representing several supposed species, they are all probably to be regarded as that entitled to the name *Spilornis cheela*, (Daudin). Several specimens so nearly resemble Temminck's figure of *F. albidus*, above cited, that they cannot be mistaken for any other species. I do not clearly recognise the nearly allied species, though they may be quite valid, especially *F. bido*, Horsfield.

Le Vaillant's figure of "Le Bacha," Ois. d'Afr., i. pl. 15, does assuredly bear a strong resemblance to the Asiatic bird, and I am not prepared to deny that it represents either an Indian or Malayan species; but it is also a fact, that the young bird from Mr. DuChaillu's collection bears a most unmistakable resemblance to young birds, undoubtedly Asiatic, in the Academy Museum. On inspection and comparison of any of the Asiatic with the African specimen, few naturalists would hesitate in pronouncing them identical, and the conclusion is most directly indicated that, if this African specimen is not of the same species as the Asiatic specimens, it is of a very nearly allied species. I regard it as possible, that Le Vaillant may have given a figure

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from an Indian or Malayan specimen, under the full and honest conviction that it was exactly the bird seen by him in the mountains of the Great Namaquois,—a description of error (if it is such) in which he is by no means singular. One of the most eminent ornithologists of our own times is stated to have given figures of a species of *Loxia* from American specimens, in his splendid work, "The Birds of Europe,"—and if so, entirely justifiably, the European and American species never having then been suspected of being different species.

The specimen now before me, from Western Africa, I regard as proving conclusively that a species, at least nearly allied to *Spilornis cheela* and *S. bido*, inhabits Africa, and I have no doubt that this species was seen and described by Le Vaillant with entire truthfulness. He may not have figured a specimen obtained by himself, but even on this point there is only hypothetical conjecture, not evidence. The bird described by him is, moreover, entitled to the name *Falco Bacha*; an appellation given by Daudin, as cited above, entirely on the faith of the description in Oiseaux d'Afrique. No Indian nor Malayan species is fairly entitled to this appellation, though it has been applied to both, with observations thereon not quite warranted by the facts. Various, not remotely allied, forms have recently been discovered in Africa, (*Circetus scoturus*, *fasciolatus*, and others,) and my opinion is, that the adult of this species of Le Vaillant will yet be forthcoming.

### 3. HALIAETUS BLAGRUS, (Daudin).

*Falco blagrus*, Daud., Traité d'Orn., ii. p. 70, (1800).

Le Vaill., Ois. d'Afr., i. pl. 5.

In the Catalogue of Mr. DuChailu's collection in the Camma and Ogobai country, above alluded to, I gave this name to a specimen of a young bird which I regarded as identical with others in the Academy Museum. On re-examination of this specimen, I am inclined to doubt its identity with any species known to me, though it is in plumage not sufficiently mature to compare satisfactorily or to determine from my present materials. It is so much smaller than the young *H. vocifer* that I cannot believe it identical, though bearing some resemblance to the youngest specimen of that species (*H. vocifer*) in the Academy Museum. The feet, especially, are disproportionately smaller and weaker. In the *Haliaeti* of North America, there is a very considerable diversity of size, but never so great in the same species, to my knowledge, as in the specimens here mentioned.

Though, perhaps, too young to present even structural characters in a reliable degree, the present specimen seems to show relations to the Asiatic group of which *H. leucogaster* is a well known species, and of which Mr. Blyth and Dr. Jerdon give the name *Falco blagrus*, Daudin, as a synonyme. Without being able, at present, to assent to this disposition of *F. blagrus*, I regard the views of those excellent naturalists as at least an important approximation to its relationship, but am disposed also to suspect that my specimen may be the young of a species the adult plumage of which remains to be discovered. I regard it as undoubtedly the young of the *Blagre* of Le Vaillant, as above cited, the credibility of whose narrative in relation to which I do not doubt in any particular. The relative size of the feet in this species and in *H. vocifer* may readily be seen in plates 4 and 5 of that author's Oiseaux d'Afrique.

### 4. LIMNAETUS AFRICANUS, nobis.

Belongs to the same group as *L. cirrhatus* (= *Falco limnaetus*, Horsf.) and *L. Kieneri*, and bears a general resemblance to both of those species, and is about the same size. Upper parts black, under parts white.

General form very strong; bill rather short, fully curved; edge of upper mandible lobed; wing moderate, fourth and fifth quills longest, and nearly equal; tail rather long; tarsi thick, and densely feathered to the toes, the bases

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of which are also feathered; toes and claws very strong. Entire upper parts brownish black; plumage of the back and neck behind white at base; rump and upper tail coverts with concealed large spots of white; quills brownish black on their outer surface, with a few transverse bands of a darker shade of the same color, and with a large space on their inner webs white; under surface of quills white, with about three transverse bands of black. Entire under parts white; flanks, under tail coverts and tibial plumes externally with large spots of brownish black; tail on its upper surface dark ashy brown, with about five wide transverse bands of brownish black, and narrowly tipped with white, on its under surface ashy white, with a few transverse bands of black. Under wing coverts white, with large spots of black; tarsi white; cere and toes yellow; bill dark bluish brown. Axillary feathers brownish black, the black spots on the under wing coverts unitedly form a large space of that color on the under surface of the wing. Total length about 22 inches; wing 14; tail  $9\frac{1}{2}$ ; tarsus  $2\frac{1}{2}$ ; bill, from corner of mouth direct to tip of upper mandible,  $1\frac{1}{2}$  inches.

*Hab.*—Ogobai River, a tributary of the Camma River, Western Africa.

*Spec.* in Acad. Mus., from Mr. DuChaillu's collection.

Two specimens of this Hawk-Eagle are in the collection from the Camma River, above mentioned, and appear to represent a species hitherto unknown, probably generically different from any other of Western Africa. Though, in my opinion, properly to be included in the group *Limnaetus*, this bird is more strongly organized than either *L. niveus*, *cirrhatus*, *Kienerii*, or other of the Asiatic species that have come under my notice, and more decidedly *aquiline* in some points of character. The *tarsi* are very thick and densely covered, much more so than in either of the species just mentioned, and quite as much so as in the larger *Aquila*, or as in the Owls of the genus *Bubo*. The bill also is strong and fully curved. No crest is apparent in either specimen, though there is, perhaps, a slight elongation of the occipital feathers.

##### 5. *OTUS STYGIUS*, (Wagler.)

*Nyctalops stygius*, Wagl., Isis, 1832, p. 1221.

Archives du Mus., Paris, 1844, pl. 24.

Several specimens of this little known species have been received at the Smithsonian Institution in the valuable collections presented by Mr. Sartorius, and obtained by him at Mirador, near Vera Cruz, Mexico. All of them correspond with the descriptions of both Wagler and Pucheran, though darker than the figure given by the latter, as above cited.

##### On a new CORMORANT from the Farallone Islands, California.

BY J. G. COOPER, M. D.

*GRACULUS BAIRDII*, Gruber, MSS. *The White-patch Cormorant.*

? *Graculus leuconotus*, Audubon.

*Specific Characters.*—Male in spring. Head and neck changeable violet and purple with green reflections; body dark green. Back and wings greenish purple, the quills brownish towards their ends and beneath. Flanks with a large white patch on each side about equal in size to the bird's foot, mostly concealed by the wings when folded. Tail like the wings. Head with a crest of narrow loose feathers about an inch long, arising on the middle of vertex above the eyes; another similar crest arising just behind the occiput, rather longer. Bill very slender, subquadrangular, strongly and abruptly hooked. Length 27 inches; extent 40.00, wing 10.75; tail 7, bill along ridge 1.90, along gape 3.00, its height and width at base each about 0.50 inch; tarsus 1.50; outer toe and claw 3.76; inner do. 1.30; second and third quills about equal, longest; half an inch longer than secondaries and an inch 1865.]

longer than tertiaries. Iris green, bill horn-black; feet pure black. Gular sac black, with red marks (shrinking and looking dull red when dry). A narrow patch of skin around eye, extending as far back as that around angle of mouth and gular sac. A sharp angle covered with feathers extends on middle line of throat, a little further forward than eyes. Forehead feathered down to bill, leaving only a narrow loreal space bare.

This species is closely related to the *G. violaceus* of the Oregon and Washington coasts, and replaces it as on the coast of upper and lower California. According to Mr. James Hepburn, it differs in a much more slender bill and other points of structure, as well as in the presence of the conspicuous white patches on the flanks.

In 1834 Mr. J. K. Townsend saw "at Cape Disappointment ten Cormorants, one with a white tail, the others with a white rump," which, without further description, Mr. Audubon called *Phalacrocorax leucurus* and *P. leuconotus*. It is quite possible that Townsend might have referred to *P. bairdii*, in his notes as above quoted, but as neither attribute applies to the present species the names would be inadmissible, even if accompanied by a diagnosis. I myself saw what I believed to be this species at the mouth of the Columbia River, in July, 1854, but could not obtain specimens. Mr. F. Gruber, of this city, was the first to secure specimens of the species and distribute them as *P. bairdii*, (named after Prof. S. F. Baird, of the Smithsonian Institution) and informs me that the species was published under that name in Germany, although I have not been able to find it, and think it is possible that it may still be a manuscript communication. It is with great pleasure that I append the following note on this species:

*Note on Graculus Bairdii, the White-patched Cormorant of the Farrallone Islands, California, by JAMES HEPBURN, San Francisco.*

(From a letter addressed to the Smithsonian Institution, dated Dec. 30th, 1862.)

"While at Barclay Sound, I noticed that there appeared to be a Cormorant there about the size of the one from the Farallones—but without any white spot. I could only get one of them, and that on the last day I was out. On examining it, I found that it was of the same size as the other, but it had an orange gular pouch, as described by Audubon, whereas the other, as I have already insisted, has a dusky pouch, with numerous bright red papillae, much too striking a point to be overlooked by any one who sees the bird while in the flesh. Another difference is that the irides of the former are brown, those of the latter sea-green. The plumage too is dissimilar in color, though both of them might fairly be called violet green. In the Farallones' bird, however, the green greatly predominates, in the other the violet. With respect to the white spot, I have seen the bird with it as early as February, and as late as the middle of July, at which time it showed no signs of disappearing, though the *G. dolophus* had months previously lost its crests. I have never been able to see the bird in autumn, which I am very anxious to do. If, as I think, it then appears with the white patch, the question of its being the breeding plumage is disposed of. At any rate the birds in Barclay Sound had no patch at the end of March. The only remaining conjecture is that one may be the young of the other; and this I find is Dr. Suckley's idea, who appears to have remarked both kinds at Cape Disappointment. To this I object that I do not know of the patchless bird having been noticed in California, and I am very certain that I saw none with a patch about Vancouver Island. As to their frequenting Cape Disappointment, that would only prove that to be the boundary line of their respective habitats. I am aware that it is dangerous work to build speculations as I am doing, on a single specimen; but I shall do my best to find out where the northern bird breeds, and to obtain a sitting bird with its eggs; and then should the differences be equally marked at that period, if there is any such thing as species, the two birds must, I think, be pronounced distinct."

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## On extreme and exceptional variation of DIATOMS, in some White Mountain localities, &amp;c.

BY F. W. LEWIS, M. D.

In my notice of some new and singular intermediate forms of Diatomaceæ from the Saco headwaters, in the Proceedings of the Academy for December, 1863, I advanced a theory based on the comparative absence of *Synedra* and *Nitzschia* in the *sub-peat* of this country, that these curious species were *transitional* or *comprehensive types* conducting from *Surirella* and allied genera, towards the more modern *Synedra* and *Nitzschia*; and that their continuance as living organisms probably depended on exceptional conditions of soil and water, more or less limited in their influence, peculiar to the Saco and similar localities.

Since the publication of that paper I have received from my friend, Mr. C. Stodder, of Boston, a very interesting lot of slides containing all of these anomalous species, prepared by himself and Mr. R. C. Greenleaf, of Boston, from gatherings at various points along the White Mountain range.

His localities are as follows:

(1.) "Brook near the Flume," (Franconia Notch)—thirty miles from the Saco pond, and near the western outlet of the valley; contains *Surirella Baileyi*, *S. intermedia*, *Actinella punctata*, *Eunotia incisa*.

(2.) "Lafayette Mountain Lake," not many miles distant from the preceding. This lake is at a considerable elevation; a still sheet of water; contains *Surirella intermedia*, *Actinella punctata*, *Eunotia incisa*, *Synedra hemicyclus*.

(3.) "Brook near Bethlehem," on the S. E. side of the Crawford Notch (Saco) about 15 miles distant, also in the valley; contains *Surirella intermedia*, *S. anceps*, *S. delicatissima*, *S. Baileyi*, *Synedra hemicyclus*.

(4.) "Maurans Lake," on the Cannon Mountain, near Franconia; contains *Surirella Baileyi*, *S. anceps*, *S. delicatissima*, *Actinella punctata*, *Synedra hemicyclus*.

Of this locality Mr. S. writes, "This Lake is on the Cannon Mountain at a high level rarely visited by travellers. The gathering is surface water."

(5.) "Bemis Pond," not many miles from the Saco spring, is a small Lake. The gathering, according to Mr. S., is "a peculiar sub-aqueous deposit" forming the bottom of the pond, "about six feet thick, and composed of nearly pure diatoms." The contained species are *Surirella Baileyi*, *S. intermedia*, *S. anceps*, *Eunotia incisa*.

Mr. Stodder adds, "that in his opinion the only explanation of the origin of this and other similar deposits is afforded on the supposition that these diatoms were originally carried out into the still waters of the lake by small streams, and there deposited," an explanation not altogether satisfactory, as most of the species are still-water forms: *Navicula rhomboides*, *N. firma*, *N. major*, *Eunotia robusta*, &c., usually found in ponds and boggy pools.

Similar deposits, not containing any of the *transitional* species, occur at other localities in New England. One of the most remarkable, ten feet in thickness, is at Randolph, Massachusetts, another at Bristol, N. H.

Mr. S. thinks, also, that these beds have been deposited at varying periods since the *glacial* period.

(6.) "Echo Lake" (Franconia Notch,) a remarkably beautiful pond lying in the very gorge of the Notch; contains *Surirella intermedia*, *Synedra hemicyclus*, *Eunotia incisa*, and curious varieties of *Navicula seriens* and *Odontidium tabellaria*, hereafter to be noticed.

(7.) "Gibbs Falls," a short distance from the Saco springs to the west, contains *Surirella intermedia*, *S. delicatissima*, *Actinella punctata*, *Eunotia incisa*, along with recent species.

(8.) "Milldam at Gorham," on the Glen side of Mount Washington, con-  
1865.]

tains *Surirella intermedia*, *S. anceps*, *S. delicatissima*, *Eunotia incisa*, &c., along with recent species.

These localities are all within the range of glacial influence.

After a careful examination of the slides, prepared from gatherings from these localities, I have been struck not only by a general correspondence in their species and varieties to those of the Saco and Wolfboro muds, but also by their unlikeness to species and varieties outside the White Mountain tract. In speaking of the Saco and Wolfboro species I alluded to their general resemblance to those of the *sub-peat* and *peat* deposits; the same remark of course holds good in reference to Mr. Stodder's localities. I will here simply confine myself to the statement of this general resemblance which further on will be illustrated by a table of species.

There is one point, however, relating to the curious tendency to variation, usually on a definite direction, apparent in many of these localities in common with post-tertiary deposits in other northern sections of this country, which requires a passing notice.

This tendency, which for convenience I shall call *metamorphic*, seems to coincide with the *abundant* introduction of certain genera in new localities. It is marked by a singular relaxation of the laws governing what I have before termed the *non-essential* characters of genus; in other words, while respecting the more fixed and positive generic characters (*essential*), as *axæ*, *canaliculi*, *median lines*, *nodules*, &c., it would seem to exhaust its influence on the more *general* and *unimportant* ones, as size, outline, striation, &c., common to all diatoms (*non-essential*.)

Besides the *intermediate* or *comprehensive* type already spoken of, there would appear to result from this *metamorphic* tendency a *subjective* variation in many co-existing genera whether allied or not to the incoming one. This variation, which is not always special in its direction towards any type or genus, affects principally the size, form, valvular outline and striation of many species, manifesting itself oftenest in a disposition to assume an *undulate*, *crenulate*, *apiculate* or even *cruciform* shape; more rarely to lose these characters. It would seem to originate in a superabundance of the sporangial element, and frequently begets irregular, abnormal or unsymmetrical forms, according to the more or less spasmodic or intermittent action of the disturbing force. I may add that, in accordance with a well known law, most of these so formed varieties, where involving alteration of *generic* characters, as *Surirella intermedia*, *S. anceps*, &c., or where irregular and unsymmetrical, as *Actinella*, either rapidly disappear by a process of degeneration (visible in *S. intermedia*), or revert to the normal type, while the extreme *varieties*, not implicating *generic* character, on the other hand may often become more or less permanent, as in *Navicula firma*, *N. rhomboides*, *N. seriens*, and others.

To render more intelligible what I have tried to explain above, I shall now notice a few of the most remarkable varieties contained in the Saco spring, Wolfboro, and Mr. Stodder's localities.

(1.) "NAVICULA SERIENS" (Kutz.) "V. acute; *transverse* striæ faint, 60 in ·100; *longitudinal* distinct, 36 in ·100;" frustules often cohering: Length ·0017" "to ·0035" (Smith.)

(2.) Var. *a* (*apiculate*.) V. varying from lanceolate elliptic to rhomboid, with apices more or less produced and capitate (fig. 5a, pl. ii.)

(3.) Var. *b* (*cruciform*.) = *N. foliis*, (Ehr.) = *N. inflata*, (Ehr.)? "V. much inflated, compressed, sloping abruptly towards the produced and often truncate apices; extreme variety *cruciform*," (fig. 5b, pl. ii.)

Var. *a*. (*apiculate*) about two-thirds, and Var. *b*. (*cruciform*) less than one-half the length of the typical form.

*Striation* in both varieties beyond a certain distortion on the *latter* variety precisely resembling that of the typical form.

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My attention was attracted long since, by the singular likeness, in striation, median nodule, and general character, of *Navicula serians* to *N. follis*, (Ehr.), a form not uncommon in northern post glacial deposits.

Ehrenberg's loose figures of the latter (*N. follis*), give so many varieties of outline, and his description is so vague, that in time it seems to have become confounded by the English writers, with *Navicula inflata*, a species having no analogies to it beyond a slight resemblance in outline.

Indeed it is probable, that Ehrenberg himself, owing to the use of imperfect microscopes may have been led to associate these two very distinct species, and in distributing specimens may thus have originated the mistake.

However this may be, it is evident that in describing the form called *N. follis*, in the Bridgewater peat, (Mass.,) he did mean the one figured as var. *b. cruciform*, of *N. serians*, fig. 5 *b. pl. ii.\**

The general resemblance in character, however, would not have sufficed to prove the specific identity of these two forms, viz. *N. serians* and its var. *b. cruciform*,—had it not been for the discovery of a second variety which bridges over the interspace—that figured as *N. serians*, var. *a. fig. 5, a. pl. ii.* This variety occurs in two of the White Mountain localities, Bemis Lake, and Echo Lake, along with the typical form and the cruciform, var. *b.* a strong corroborative evidence beside that afforded by numerous intermediate varieties of a common derivation.

As this is a fact which, if recognized, involves a most important point in its bearing on the laws which determine species, I have drawn with utmost care (fig. 5, *a. b. pl. ii.*) the valves of what appear to be average specimens of these two varieties. The Bemis Lake' slides of Mr. Samuels, now very difficult to obtain, are very carefully mounted, and afford beautiful illustrations of these forms,—as well as of *Stauroneis Stodderii*, n. sp. (Greenleaf,) (fig. 6, *pl. ii.*) The material is quite scarce at the present time, although it could no doubt readily be procured from the original locality.

(1). "NAVICULA FIRMA" (Kutz).—Large, turgid, oblong, lanceolate, with obtuse, cuneate ends, thick borders, and large median nodule; striæ wanting, or obscure."

(2). "Varieties."—(α). *linear oblong*, (*Navicula iridis*.) β. *pointed elliptic*, (*N. dilatata*.) γ. *cuneate* (*N. amphigomphus*.)

(3). "Secondary or metamorphic varieties." δ. *triundulate*, (not the same as *N. Hitchcockii*.) ε. *produced* (*N. producta*, *N. affinis*.) ζ. *apiculate*. (*N. amphirynchus*.)

The specific identity of *N. iridis*, *N. dilatata*, *N. amphigomphus*, and perhaps one or two other reputed species has, I believe, been generally suspected, if not recognized. Certainly, it would be difficult for any one carefully studying the Northern deposits of this country, whether recent or fossil, to resist the conviction, that they really have a common origin. With regard, however, to some of those I have termed *secondary* or *metamorphic*, their common derivation from *N. firma* is not so obvious. I believe them, notwithstanding, to be all varieties of that species, a conclusion I have arrived at, after a careful comparison of gatherings from numerous localities. As, however, a conclusion so formed may be regarded as more a matter of prepossession than admitting of proof, I shall not undertake to illustrate it by elaborate descriptions of these varieties; but this much may be said, that what has hitherto kept apart many of the best known of them, is simply difference in valvular *outline* and *number of striæ*. If, hereafter, my view with regard to the unimportance and mutability of these characters be proved correct, the union of some, if not all these reputed species will probably be necessary.

Taking all the enumerated varieties, there appear to be certain general

(\*I am the more certain of this, from my friend Prof. H. L. Smith, of Kenyon College, O., having recently written to me, calling attention to this very fact.)

points of resemblance between them. These are—(1). "*The large open median nodular space.*"

(2). "*The intra-marginal, dark, and more or less broken line or lines, with separation and distortion on the peculiar wavy longitudinal striation at that point.*"

(3). "*The sharp, clear, parallel, transverse striae.*"

This last character seems to me, to afford a valuable clue for determining the *primary* or *secondary* nature of any *undulate* or *apiculate* form. As a general rule, it will be found, I think, that *parallel transverse striae*, coinciding with an *undulate margin*, imply a *secondary* or *metamorphic* action on a species whose original outline was *smooth*; while on the other hand, a *radiant transverse striation*, or, rather, one constantly *perpendicular* to the *marginal* line, indicates that an *undulate* outline is *primary*. Thus, *e. g.* the *triundulate* outline of *Navicula Hitchcockii*, concurring with a *parallel, transverse, striation*, is most likely, *secondary*; also the *crenulate dorsum* of *Himantidium undulatum* (extreme variety). While the large and showy *Navicula Sillimanorum*, (fig. 8, pl. ii.) ought by the same rule to possess a *primary* outline, although much exaggerated and intensified. In the *apiculate* forms, the *metamorphic* force being operative over but a small terminal portion of the valvular margin, renders the rule less valuable.

Although liable to many exceptions, this rule may be sufficiently general to possess a practical value, when taken in connection with other means of proof.

I cannot leave these varieties of *N. firma*, without adverting to the species known as *N. Hitchcockii*, which has been regarded by some, as a variety of the former species. There is a *triundulate* variety of *N. firma* approaching very near to it in size and outline, but differing essentially in the median line, which in *N. Hitchcockii* is remarkable as having on either side a double line, nearly parallel to its course throughout. That it is of the habit of *N. firma*, however, can hardly be questioned; and although not clearly traceable to that species, may it not, perhaps, be a compound variety, resulting from the conjugation of species reputed distinct, but in reality, only so sporadically?

I take occasion here to quote some very interesting remarks of Professor H. L. Smith, who has long been studying the habits of *living diatomaceae*, and whose observations bearing on this and other points in that connection, will, I trust, shortly be made public. In a recent letter to me, speaking on this very subject of extreme variation, he says: "The variety of *N. firma*? like *N. Hitchcockii*, somewhat, on one of the slides you recently sent me (Saco River,) is curious; but if you will examine the Bridgewater deposit, I think you will see something about *N. follis* of Ehr., that makes one almost say it is only a variety of *N. sericans*. The departure is greater, even as to form alone, than that of the specimen of *N. firma*? like *Hitchcockii* is from the type of that species."—He adds: "when I find *N. amphirhynchus* conjugating and producing *N. firma*, *Stauroneis gracilis* producing *St. phenicenteron*, and *Surirella splendida*, *S. nobilis*, quite different in form and striation, I cannot but doubt the propriety of making a new species out of every different shape and marking."

The views of Prof. Smith here expressed, cannot fail to awaken a lively interest in all who desire to have light thrown upon this perplexing question, and it is earnestly to be hoped, that the matured result of his investigations will not long be delayed.

NAVICULA RHOMBOIDES is, with one or two exceptions, of all northern species the most common and widely distributed. It offers a broad range of form and outline. Like *N. firma*, it has its *elliptic*, *produced* and *apiculate* forms. I may preface what I have to say of this species, by remarking that it is, in my opinion, impossible to determine on any positive characters, which shall distinguish it from *N. crassinervia*. The small apiculate variety which I have

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been accustomed to regard as that species, clearly runs into the typical *N. rhomboides*, of which it is most probably a colletonemoid (sporangial) offset.

Two of the numerous varieties of this species, seem to be permanently distinct—more so, in fact, than in most permanent varieties—although connected by intermediate forms with the ordinary type.

*N. rhomboides*, (Ehr.) V. nearly quadrangular, striæ, faint, parallel 85 in .001". Length .0022", to .0037". (Smith).

*Sporangial Varieties*, (1). (a). "Frustule large, V. rhomboid to lanceolate—median line double, presenting at the terminal nodules a peculiar arrangement, somewhat similar to the "porte crayon" of Dr. Greville, as it exists in *N. Lewisiana*—only much less obvious." (pl. ii., fig. 11).

The *transverse* striæ in this form, are about, 60 in .001", "the *longitudinal*, about, 45 in .001". Length variable.

*Hab.*—In nearly all fossil and recent northern deposits.

(2). (b). *N. diaphana*? (Ehr.) V. lanceolate—extremities slightly produced—obtuse, median line thicker than in var. *a*, terminating in obtuse, rounded, nodular expansions rarely attenuated laterally—striæ *transverse*, about 50 a 55 in .001". *Longitudinal*, coarser and more wavy than in var. *a*, more or less indistinct for some distance round the central nodule.

*Hab.*—Bemis Lake, abundant, Saco pond, Wolfboro, and other New England deposits. It is not so common as var. *a*. (pl. ii., fig. 10).

The former of these, is probably the ordinary sporangial variety of *N. rhomboides*; the latter, I have found more rarely in gatherings along the Saco Valley, and—I think, elsewhere in New England—I have been struck with the rarity of both these varieties, particularly, of var. *b*. on foreign slides.\*

Var. *a*, sometimes approaches var. *b* in outline; but I have never seen the latter of a quadrangular or rhomboid shape. Occasionally the terminal nodule undergoes a trifling modification, becoming slightly indented at the rounded corners. This may, perhaps, be a compound variety.

Figured at pl. ii., fig. 21, is what I believe to be *N. Carassius*, (Ehr.), (*N. cocconeiformis*, (Smith)). (Gregory's new British sp. Mic. Jour. vol. iv. pl. i., fig. 22). This is a rare American species, usually fossil. The striæ are very hard to resolve. Some of the varieties of this diatom, suggest an affinity to *N. rhomboides*; but not sufficiently marked to warrant notice.

"*NAVICULA SILLIMANORUM*," (Ehr.) An exaggerated variety of this species, I have figured, (pl. ii., fig. 8). I have found it only in the Wolfboro mud. The typical form of Ehrenberg, occurs in some of the N. Hampshire deposits. It is a singularly compact and beautiful diatom—more nearly allied to *N. nobilis*, than to *N. tabellaria*—as is shown by the relations of the striæ to the marginal line, which according to the rule before mentioned, indicate the intensification of a *primary* undulate outline.

*NAVICULA GASTRUM*, (Ehr.)? fig. 17, pl. ii). Rare in the Wolfboro mud. I have not come across it elsewhere. The striation is more or less irregularly punctate around the median nodule, and along the median line, as in *N. granulata*. (Bailey). The striæ are radiant—otherwise, it might be set down as a degenerate variety of *N. firma*.

"*NAVICULA PLACENTA*," Ehr. fig. 4, pl. ii.—*N. apiculata*, Greg. (Mic. Jour., vol. iv., pl. i., fig. 13)—*N. rostellum*. (Smith). This little species is ventricose or elliptic, with a nipple-like projection, at each apex. It corresponds perfectly in outline, with Dr. Gregory's figure; but the striation is so peculiar in its arrangement, that I have thought it best to figure the valve. The striæ are of two kinds. (1). *transverse*, sharp, radiant, close. (2). *obliquely curved*

(\* The slides coming from abroad, labelled "Amician test," are, I believe, prepared from material obtained from this country.)

in both directions towards the median line, crossing as in *Hyalodiscus subtilis*. (Bailey).—coarser than the *transverse*. These characters are constant in all the specimens I have of this species, from this and other localities.—Wolfboro, N. H., Duck creek, Del. river.

**STAURONEIS.** This genus is very abundantly represented, particularly in the Wolfboro mud. It is common in all post tertiary deposits, and presents a bewildering looseness of character.

I have long tried to understand the meaning of *S. Baileyi*, (Ehr.) and its varieties. Some time ago, I came to the conclusion, that the one having the quadrangular shape and terminal inflexion of *St. acuta* was a sporangial var. of that species; and that the other (Pterioidea) bore the same relation to *St. phenicenteron*. This belief has recently been shaken, by my finding the latter variety (Pterioidea) in the "Nova Scotia" deposit, with a very strongly marked terminal inflexion, and the other characters of size, striation, and outline, so variable as to compel the conclusion, that they are both *interchangeable* varieties of a common species—possibly *St. phenicenteron*.

A very interesting study of these forms is afforded, by the Nova Scotia, Blue Hill pond, (Me.) and, in fact, by nearly all the northern deposits, recent and fossil.

**STAURONEIS LEGUMEN**, (Ehr.) The aberrant variety, (pl. ii., fig. 14), will show the range of outline in this species. Frustules of this shape occur sparingly in the Wolfboro mud, along with the ordinary form.

**STAURONEIS AMPHICEPHALA**, (Kutz.) This species I notice, to direct attention to the figure of *S. anceps* in Prof. Smith's "Synopsis," which, in all respects, answers to the description and figure of Kutzing's (Bacillarien, p. 105, pl. 30, fig. 25). *S. amphicephala*. *S. anceps*, (Ehr.), is subcapitate with truncate apices, *S. amphicephala*, capitate with rounded ends. Very likely, these two species are identical. The mere length or relations of the stauros to the margin not constituting a valid reason for keeping them apart.

I cannot close what I have to say about *Stauroneis* and its varieties, without alluding to a *stauroneiform* tendency which seems to prevail in certain localities. This is marked in the Wolfboro, where seven species of *Stauroneis* co-exist with a number of *stauroneiform* varieties of Navicula.

I now pass on to notice some varieties of—

**HIMANTIDIUM and EUNOTIA.** I have before spoken of the prevalence of these genera in the Saco and cotemporary deposits, and likewise of the remarkable subordination of their specific character to the *metamorphic* force, as exemplified in *Himantidium pectinale*, and *H. arcus*, *Eunotia robusta* and *E. incisa*. I now give a few illustrations of the most common of these metamorphic varieties, (pl. ii., fig. 12, 13, etc.) which strongly corroborate the view entertained by the late Prof. W. Smith, of the probable common derivation of many of the known British species of *Himantidium*, from *two* types; viz.: *H. pectinale* and *H. arcus*. (vide Synopsis, vol. ii., p. 11).

Of these varieties, pl. ii., fig. 13a, represents a common sporangial form of *Himantidium undulatum*. It will be seen that the *dorsum* is already hollowed out as a preliminary step towards another common variety (sporangial) of the same diatom\* of which variety I have figured only the extreme and last stage, at pl. ii., fig. b. This last, represents quite nearly *two* conjoined frustules of *H. undulatum* (type), as does the intermediate variety, *two* of *H. pectinale*.

Whether or no these remarkable sporangial frustules ever undergo trans-

\*These slides prepared by Mr. Samuels, of Boston, labelled *Himantidium undulatum*, afford a very fine illustration of this variety, which is abundant in fresh water streams throughout Massachusetts.)



verse division, I am unable to say from actual observation; but their appearance is certainly suggestive of that phenomenon. I ought to add, that the *secondary* gibbositics on the ventral aspect of var. *δ*, are rarely as well marked as shown in the figure (13 *b*. pl. ii).

Of *EUNOTIA INCISA*, pl. ii., fig. 12*a*., represents an extreme variety. The extraordinary attenuation of the valve well illustrates the *synedroid* bias, noticeable in the Saco, and, to a lesser degree, in the Wolfboro muds.

The inflexion peculiar to the terminal portion of the valve in these bacillar varieties of *E. incisa*, often nearly reaches the dorsum. On the other hand, an opposite variety of *E. incisa* occurs, which is nearly as broad as long.\*

*Eunotia camelus*? (fig. 12*b*. pl. ii.) is probably allied to *E. incisa*. Some of the frustules are long and narrow, with hardly any perceptible undulation. = *Eu. impressa*, (Ehr.), occurs sparsely at Wolfboro and Bemis Lake.

*EUNOTIA BACTRIANA*, (Ehr.), (fig. 16, pl. ii.) is quite common. There appears to be considerable range of variation in this species.

*EUNOTIA PENTAGLYPHIS*, (Ehr.), as figured (fig. 4, pl. ii.) is also a changeable form. It is widely distributed in the post-tertiary deposits, and has all the characters of a *metamorphic* variety of *Eu. robusta*.

*ODONTIDIUM TABELLARIA*, (Smith) = *Dimeregramma tabellaria*, (Ralfs.) I have retained this name, as that by which this diatom is best known. The two varieties figured in Smith's British Diatomaceæ, and which may, for convenience, be termed *primary* and *secondary*, seem to be peculiarly obnoxious to the *metamorphic* force. Figs. 1 and 2, pl. ii., represent a series of elongated varieties from the Saco river, (Synedroid). Of these, two are specially noticeable, 2*b*, and 2*d*. The first of these has strong marginal puncta; (Nitzschoid?) while the second exemplifies the same suggestive principle of symmetrical variation seen in *Himantidium undulatum*, fig. 13, var. *b*. pl. ii.

The *punctate* tendency, which is quite exceptional, manifesting itself only on a few frustules, is to a lesser degree observable in *Tabellaria*, in the same deposit.

There remain to be considered, one or two forms in these deposits, which are not clearly traceable to any known species.

(1). *NAVICULA (STAURONEIFORM)* n. sp.? (pl. ii. fig. 9). F. V. not ascertained. V. lanceolate, gradually attenuated towards the capitate or sub-capitate extremities. Striæ sub-marginal, interrupted for a considerable space opposite the central nodule.

*Hab.*—Wolfboro. Common. (Fig. 9, pl. ii.)

This little form I have not named, as it may possibly prove a stauroneiform variety of some known species. This *stauroneiform* habit is very obvious in the Wolfboro varieties; as is the *synedroid*, in the Saco.

(2). *STAURONEIS STODDERII*, n. sp. (Greenleaf), pl. ii. fig. 6.) F. V. Linear, with slightly rounded ends; connecting membrane slight and fragile. V. elliptic lanceolate, with more or less produced and slender extremities. *Stauros* linear, reaching the margin. *Striæ* (longitudinal) parallel, sharp and clear. Variable in number. *Striæ* (transverse), radiant, distinct, about 55 in .001. Length variable.

*Hab.* of *St. phenicenteron* and *St. amphicephala*. Bemis Lake, Wolfboro, Graham pond.

This beautiful species was first made known to me by Mr. Stodder, who had it from Mr. R. O. Greenleaf, of Boston, who names it *St. Stodderii*, in compliment to the former observer. He has permitted me to describe it.

\**Eunotia nodosa*. Var. *Himantidium pectinale*? in the Bemis Lake, presents a remarkable variety, analogous to the above in proportions. It is also nearly as broad as long, and slightly constricted.)

The valves which are singularly light and graceful, the linear striation giving the surface much the aspect of a scale of *Lepisma*, are rarely found united by the connecting membrane. Mr. Greenleaf communicates the following facts, with relation to this diatom; "The *longitudinal* lines are parallel throughout, gradually fading away, so that they are not seen near the apices; they are faintly visible with careful illumination and focussing *over* the stauros; margin beaded." I have not been able to verify Mr. G.'s observations. It seems to me, that the *longitudinal* striae are *internal*, and underlie the stauros, and that they are traceable up to the apex, in that limited number of parallel striae which the narrow area of the extremity can accommodate. The beaded marginal appearance, is probably due to the effect produced by the inflexion of the striae. Mr. Stodder believes the longitudinal striae to be corrugations of the internal membrane, designed to strengthen the valve.

The figure (fig. 6, pl. ii.) is not sufficiently elongate for an average specimen of this species.

"TETRACYCLUS" (abnormal)? (pl. ii., fig. 3a, & b.) F. V., much as in the typical form, (genus); filament with a central constriction; frustules small; septa alternate, equal; V. deeply constricted in the centre, (not unlike a dumb-bell crystal of oxalate of lime).

*Hab.* of *Tabellaria* and *Tetracyclus*. Lafayette Mt. Lake.

This singular form occurs only at the above locality. Being minute and much intermixed with *Tabellaria* and *Odontidium tabellaria*, it is apt to be overlooked on a crowded slide.\* The septa are quite insignificant. They exist at both ends of the valve. This anomalous form suggests a *metamorphic* variation, mediate between *Tabellaria* and *Tetracyclus*, and is a true *comprehensive* type, although less perfect than *Surirella intermedia*. The relations of the septa, small as they are to the valve, and to each other, are constantly those of *Tetracyclus*, (never of *Tabellaria*), though the impressive character of outline, passively yielding to the disturbing force, has wandered far away from the typical pattern of that genus.\*

I will now, as briefly as possible, sum up the conclusions I have tried to establish in this and the previous paper. After which summary will be found a comparative table of some of these species.

These are—(1). That the genera *Synedra*, *Nitzschia*, *Tabellaria*, and perhaps, *Odontidium* and *Himantidium*, made their first appearance as *prevalent* forms on this continent, at varying epochs, since the *Glacial* period.

(2). That there are epochs, which may be termed *transitional*, coinciding with the *abundant* introduction of genera, (as above), marked by a singular relaxation of the laws which govern generic character, (*metamorphic* force.)

(3). This *metamorphic* force while respecting the more fixed and positive generic characters, (*essential*), usually attacks the more variable and unimportant characters, (i. e. those common to most diatoms), (*non-essential*), of those genera most nearly allied to the *incoming* one, giving rise to *comprehensive* or *synthetic* forms; as *Surirella intermedia*, *Sanceps* &c.

(4). During these epochs, there would also seem to exist a *subjective* variation in many of the cotemporary genera, whether allied or not to the prevailing one—originating in this *objective* force—still affecting the *non-essential* characters, principally *form* and *outline*, e. g. *objective* genera *Synedra*,

\*The *metamorphic* force seems to run riot in this particular locality, (Mt. Lafayette Lake), and nearly all the species appear to participate in this tendency to depart from their normal type. The largest and showiest frustules of the *pointed elliptic*, which is by far the finest variety of *N. firma*, pass down through many intermediate forms into a minute and characterless *N. affinis*, *N. rhomboides* ranges from the smallest *apiculate*, up to the magnificent var. b. (pl. II., fig. 11), curious and anomalous varieties of *Tabellaria*, of *Odontidium tabellaria*, some punctata, others *Synedroid*, eccentric varieties of *Synedra hemicyclus*, of *Eusotia incisa*, *Eu. camelus*, *Eu. pentaglyphis*, *Eu. robusta*, of *Himantidium gracile*, concurring with the abnormal *Actinella punctata*, *Surirella intermedia*, and *S. delicatissima*, altogether form a grouping confused and incoherent beyond precedent.)

*Nitzschia*; subjective genera, *Surirella*, *Himantidium*, *Odontidium*, *Tabellaria*, *Eumotia*, and resultant varieties. (Pl. ii., figs. 1, 2, 12, 13).

(5). An extreme variation, *not special* in its direction towards any type or genus, extending to the valvular outline of many altogether distinct genera, characterizes these metamorphic epochs; manifesting itself in disposition to assume an *undulate*, *apiculate* or *crenulate* contour, or to lose these characters, e. g. *Eumotia incisa*, *Himantidium*, *Navicula serians*, *N. firma*; or in irregular, abnormal or unsymmetrical forms, due probably, to unequal or spasmodic action of the metamorphic force, e. g. *Actinella*, *Tetracyclus*, (fig. 3, pl. ii.)

(6). These so-formed varieties, where based upon changes of generic character, or where *abnormal* or *unsymmetrical*, are always short-lived; on the other hand, varieties *not involving generic* character, often become fixed and permanent, as *Navicula firma*, (var. *iridis*, *amphigomphus*, &c.) *N. serians*, var.  $\beta$ , *N. rhomboides*.

(7). That it is not improbable, that many species not reputed distinct, are capable of conjugating with each other; and that peculiarities of outline and striation constitute but uncertain data for division of species.

Table of Species.

(\*) Indicates the presence of species at the locality.

Localities where the "intermediate type" species occur.	Saco.	Wolfboro.	Lafayette Mt.	Bemis Lake.	Flume.	Bethlehem.	Mauran Lake.	Echo Lake.	Gibbs' Falls.	Gorham.
<i>Surirella Baileyi</i> .....	*	*	*	*	*	*	*	*	*	*
" <i>intermedia</i> .....	*	*	*	*	*	*	*	*	*	*
" <i>anceps</i> .....	*	*	*	*	*	*	*	*	*	*
" <i>delicatissima</i> .....	*	*	*	*	*	*	*	*	*	*
<i>Actinella punctata</i> .....	*	*	*	*	*	*	*	*	*	*

2.

Localities of species usually fossil, and of those metamorphic in the direction of <i>Synedra</i> , and <i>Nitzschia</i> .....	Bridgewater.	Blue Hill pond.	Saco.	Wolfboro.	Lafayette Mt.	Bemis Lake.	Flume.	Bethlehem.	Mauran Lake.	Echo Lake.	Gibbs' Falls.	Gorham.	Some of these species also illustrate the irregular variation of the next section, (No. 3). <i>Eumotia nodosa</i> , I have not noted, as it is but a doubtful species.
<i>Himantidium pectinale</i> .....	*	*	*	*	*	*	*	*	*	*	*	*	
" <i>arcus</i> .....	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Eumotia incisa</i> (long var.) ...	?	?	*	*	*	*	*	*	*	*	*	*	
" <i>robusta</i> .....	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Odontidium tabellaria</i> .....	*	?	*	*	*	*	*	*	*	*	*	*	
<i>Synedra hemicyclus</i> .....	?	?	*	?	*	*	*	*	*	*	*	*	

Species illustrating irregular variation not in any special direction.	Bridgewater.	Blue Hill pond.	Saco.	Wolboro.	Lafayette Mt.	Bemis Lake.	Flume.	Bethlehem.	Mauran Lake.	Echo Lake.	Gibbs' Falls.	Gorham.
<i>Navicula serians</i> .....	*	*	*	*	*	*	*	*	*	*	*	*
“ “ var. <i>a</i> .....	*	*	*	*	*	*	*	*	*	*	*	*
“ “ var. <i>b</i> .....	?	?	*	*	*	*	*	*	*	*	*	*
“ <i>firma</i> and var.....	*	*	*	*	*	*	*	*	*	*	*	*
“ <i>rhomboides</i> .....	*	*	*	*	*	*	*	*	*	*	*	*
“ “ var. <i>a</i> .....	?	?	*	*	*	*	*	*	*	*	*	*
“ “ var. <i>b</i> .....	?	?	*	*	*	*	*	*	*	*	*	*
<i>Stauroneis Baileyi</i> and var.....	*	*	*	*	*	*	*	*	*	*	*	*
<i>Eunotia incisa</i> , (ordinary var.).....	?	?	*	*	*	*	*	*	*	*	*	*
“ <i>pentaglyphis</i> .....	?	?	*	*	*	*	*	*	*	*	*	*
“ <i>bactriana</i> .....	?	?	*	*	*	*	*	*	*	*	*	*
<i>Tetracyclus?</i> (abnormal).....	*	*	*	*	*	*	*	*	*	*	*	*
<i>Navicula Sillimanorum</i> .....	*	*	*	*	*	*	*	*	*	*	*	*
* <i>Surirella decora</i> .....	*	*	*	*	*	*	*	*	*	*	*	*

I add a list of the ordinary grouping of species in these localities. This is necessarily incomplete and liable to error, owing to the fact that in some of these muds, within the immediate influence of mountain streams, as parts of the Saco spring—the Flume—Bethel—there is a large dilution with more modern forms. These I have excluded and placed in a list by themselves. The absence of these species in the *still pond* localities of the White Mountains, is, I think, sufficient evidence of their *extraneous* habitat, when found along with the grouping below.

*Cymbella cuspidata*, *C. helvetica*, *Epithemia ventricosa*, *E. argus*, *Eunotia robusta*, *Eu. incisa*, *Surirella nobilis*, *S. oblonga*, *S. decora*, *Navicula firma*, *N. serians*, *N. rhomboides*, *N. major*, *N. tabellaria*, *N. viridis*, *N. acrospheria*, *N. radiosa*, *N. mesolepta*, *N. borealis*, *N. Staureiformis*, *N. elliptica*, *N. cuspidata*, *Stauroneis phenicenteron*, *St. gracilis*, *St. Baileyi*, *St. anceps*, *St. legumen*, *Cocconema lanceolatum*, *C. cymbiforme*, *Gomphonema coronatum*, *G. turgidum*, (var. *G. capitatum*)? *Gomphonema*, (var. *G. acuminatum*), *Himantidium arcus*, *H. pectinale*, *Odontidium tabellaria*, *Fragillaria*, (doubtful?)—*Achnanthidium*? *Tetracyclus lacustris*, (rare). *Diatoma elongatum*, (rare), *Tabellaria vulgaris* and vars. *Orthostira orichalcea*, *Cocconeis Thwaitesii*, (rare), *Nitzschia spectabilis*, (rare), *Synedra ulna*, (rare), *Navicula*=*Amphiprora navicularis*, (Ehr.)? (common in sub-peat and peat), *Navicula scutelloides*, (rare).

The following are, probably, *extraneous* species:—*Odontidium mesodon*, *O. mutabile*, *Meridion circulare*, *Cocconeis placentula*, *Synedra radians*, *Nitzschia amphiozys*, *N. tenuis*, *Pleurosigma Spencerii*, *Gomphonema capitatum*, *G. geminatum*, *Asterionella formosa*, *Collatonema vulgare*.

*Denticula* and *Amphiprora* are not represented in any of these deposits, unless by one or two doubtful forms, one of which is figured in (pl. i., fig. 6), *Amp. ornata*, the only fresh water species, is not common so far north.

\*I have omitted to notice an abnormal variety of *Surirella decora*? in the Wolboro mud. This is ovate; the median line extending for little more than one half the length of the valve, leaving an equal open area at either end. From the extremities of the median line, the faint costa branch out with a beautifully radiant arrangement, appearing as if they all arose from the same point. I have found this form also at Montmorency Falls, Canada.)

I had intended, in the present communication, to give a résumé of species contained in the "blue clay" of the Delaware river alluvium, and in adjacent localities along the river. This last I shall be obliged to defer; but as several of the figures published in my last paper were designed to illustrate it, I will briefly describe them.

"*AMPHORA INTERMEDIA*," n. sp.? (pl. i., 7 a, b and c). F. V. linear elliptic, or elliptic; margin of the inflected portion of the valve recurved, resembling a small ala; marginal puncta distinct, V. arcuate, with rounded apices finely striated.

*Hab.*—Atlantic, N. J., rare.

This delicate and beautiful species, belongs to the complex *Amphoræ* of Dr. Gregory. Its outline and appearance on the F. V. are suggestive of *Amphiprora*, from which genus, however, the absence of the terminal nodules and its valvular outline remove it. The few specimens I have found, do not enable me to judge accurately as to its average length or striation.

*NAVICULA*—n. sp.? (pl. i., fig. 8) V. rhomboid, with cuneate slightly produced extremities, striæ radiant, moniliform.

The only specimen I have of this diatom, is a detached valve, from which the figure (pl. i., fig. 8), is taken.

*Hab.*—Blue clay, Kaighn's point, Del. river.

*AMPHIPRORA PULCHRA*, var.  $\beta$ . *A. conspicua* (Greville)? (pl. i., fig. 10, a and b). I am not sure, whether this fine diatom is identical with that figured in the Mic. Journal as *A. conspicua*. (Trans. Mic. Soc., vol. ix., pl. 10, fig. 16).

My figure, which is carefully drawn from a slide of Rockaway mud, differs certainly from that of the Mic. Journal. The frustules are always twisted, as shown in fig. 10a, pl. i., and the elongated nodules have much the look of canaliculi. Its habit is that of *A. pulchra*, of which species I have thought it a variety. It rarely attains half the size of that species; occurs sparingly in many brackish and marine localities.

*MASTOGLIOIA ELEGANS*, n. sp. (pl. i., fig. 9). F. V. as shown at pl. ii., fig. 16. V. large, lanceolate, elliptic; extremities sometimes a little produced; *loculi* numerous; very minute; marginal; striæ sharp, clear, parallel; about 36 a 40 in  $\cdot 001''$ . *Median nodule* laterally produced into a fine point. Habit and growth of *M. apiculata*, of which species it may be a permanent variety. I have not, however, been able to trace the connection.

It occurs along with *M. angulata*, and the above, at Atlantic, N. J., Cape May, (Schellinger's Inlet), and as a pure gathering; abundant.

*MASTOGLIOIA KINSMANII*, n. sp. (pl. ii., fig. 15 a and b.) F. V. as shown at fig. 18b. V. lanceolate or elliptic, with more or less produced ends; *loculi* less numerous than in *M. apiculata* or *M. elegans*; the central 4 or 5, larger than the others; (this is a constant character).

*Median line* with a narrow blank space on either side, connivent at the apices; *striæ* sharp, radiant, about 40 in  $\cdot 001$ . Habit and growth of the preceding.

*Hab.*—Cape May, Cold spring, Atlantic marshes.

Not an uncommon species at the above localities. The frustule is quite thick, and of a dark, chocolate, brown color, when dry. This somewhat doubtful species I have named (provisionally) after my friend Mr. Kinsman, of this city, who first directed my attention to it, and to whom I am under great obligations for aid in mounting and preserving specimens, and for many valuable hints in their study.

There remain to be noticed, two very similar *Naviculæ*, having strong affinities with *N. Louisiana*, (Grev.) One of them (pl. ii., fig. 18.) frequently occurs along with it, and is probably, an early stage of that diatom; and the 1865.]

other, (pl. ii, fig. 20.) is a not uncommon coastal species. Both are brackish. For convenience of reference, I have provisionally named these forms, whose claims to rank as distinct species are very questionable:

(1.) *NAVICULA INCOMPERTA*, (pl. ii, fig. 20.)—V. lanceolate elliptic, with a thick double median line; terminal nodules inconspicuous; *transverse striæ* parallel; about 70 in  $\cdot 001''$ ; *longitudinal striæ* wavy, faint, about 55 to 60, in  $\cdot 001$ . Cape May, Atlantic, and Rockaway Salt marshes, common.

(2.) *NAVICULA INTERPOSITA*, (pl. ii, fig. 19.)—V. elliptic, elongated, shorter than in the preceding; *terminal* nodules usually inconspicuous. *Transverse striæ* sharp, parallel, about 50 a 55 in  $\cdot 001''$ . *Longitudinal*, straight, parallel, about 45 a 50 in  $\cdot 001$ . Paraiba Harbor, S. A.; Wilmington R., Savannah, Ga.—C. Febiger.

The front view of both these species is linear, or sometimes slightly constricted, with abruptly rounded ends, to which the suddenly inflected terminal nodule gives an emarginate appearance, as is sometimes seen in *N. rhomboides*.

In *N. Lewisiana*, on the other hand, the front view is commonly a little inflated, and the terminal curves much more gradual. The straight and long terminal nodule of this last species, subtends the arc formed by this curve, whence, probably, arises a good deal of that apparent inflation of the "extra median" lines, spoken of by Dr. Greville. (Trans. Mic. Soc., vol. xi. N. S. p. 16.)

The variation in size, form and number of striæ is very considerable in all of these species from different localities, and for the reason this measures I have given above are only approximate.

As opportunity offers, I hope to continue the notice of the Delaware river, and adjacent coastal diatoms.

## PLATE II.

- Fig. (1.) *Odontidium tabellaria*.—Sporangial varieties of primary form. ( $\alpha$ ), ordinary form,  $\beta$  and  $\gamma$ , elongated frustules.
- (2.) *Odontidium tabellaria*.—Sporangial varieties of secondary form. ( $b$ ), punctate variety of,  $c$ , elongated form,  $d$ , double sporangial frustule.
- (3.) *Tetracyclus?* (abnormal)—a. V. b. F. V.
- (4.) *Eunotia pentaglyphis*, (Ehr.)
- (5.) *Navicula serians*, a. (*apiculate*), b. (*cruciform*) variety=*N. foliæ*.
- (6.) *Stauroneis Stodderii*, n. sp. (Greenleaf).
- (7.) *Navicula placenta*, Ehr.
- (8.) *Navicula Sillimanorum*, Ehr.
- (9.) *Navicula* (*Stauroneiform*), n. sp. ?
- (10.) *Navicula rhomboides*. Sporangial var.  $b$ .
- (11.) *Navicula rhomboides*, Sporangial var.  $a$ .
- (12.) *Eunotia incisa*. ( $a$ ) extreme variety, (Synedroid),  $b$ . Biundulate variety = *Eu. camelus*.
- (13.) *Humanidium undulatum*. Sporangial, var.  $a$  and  $b$ .
- (14.) *Stauroneis legumen*, Ehr.
- (15.) *Mastogloia Kinsmanii*, n. sp. a. V. b. F. V.
- (16.) *Mastogloia elegans*, n. sp. F. V.
- (17.) *Navicula gastrum*, Ehr.
- (18.) *Eunotia bactriana*, Ehr.
- (19.) *Navicula interposita*, n. sp.
- (20.) *Navicula incompta*, n. sp.
- (15.) *Navicula carassius*, Ehr.

These figures are all magnified 500 diameters. The representations of striæ are only designed to give a general idea of their direction and character, not of number, actual or comparative.

[Jan.

Synonymy of the Species of STREPMATIDÆ, a Family of Fluvial Mollusca  
inhabiting North America.

## Part 4.

BY GEORGE W. TRYON, JR.

The first, second and third parts of this paper\* included all the species then known to science, except a peculiar group, of about sixty species of *Goniobasis*, inhabiting principally the Coosa River, Alabama. The species of this group are distinguished from others of the genus by their heavy, bulbous or cylindrical, or pupæform shapes, and their very short spires.† I was not satisfied that they belonged to the genus *Goniobasis*, and therefore reserved them for further study.

Mr. Lea has since eliminated from this group principally, his excellent genus *Eurycolon*, which still leaves most of the species, however, in *Goniobasis*. Finding that I am still unable to make a satisfactory separation, I have concluded to finish the synonymy, treating these shells as *Goniobases*.

I avail myself of this opportunity to publish those additions and corrections in the synonymy of the first three parts, which the kind assistance of my friends, and particularly of Mr. Lea, together with my own investigations have enabled me to make.

Including the species of the present paper, my Catalogue now embraces about five hundred species and three hundred synonyms†.

## 10, Lea.

1. *I. fluviatilis*, Say.  
*I. fluviatilis*, H. and A. Adams' Genera i. p. 299. Brot, Malac. Blatt. ii. p. 114, July, 1860.  
*I. fusiformis*, Lea, Chenu, Man. Conchyl. i. f. 1977.  
*I. fusiformis*, Say, H. and A. Adams' Genera i. p. 299.  
*I. tenebrosa*, Lea, H. and A. Adams' Genera i. p. 299. Troschel, Archiv für Naturgesch. ii. p. 130, 1843.
3. *I. spinosa*, Lea.  
*I. spinosa*, Lea, Chenu, Man. de Conchyl. i. f. 1973. Moroh, Yoldi, Cat. p. 56. Adams' Genera i. p. 299.

## PLEUROCERA, Raf.

1. *P. alveare*, Con.  
*Melania alveare*, Conr., Müller, Synopsis, p. 46, 1836.  
*Megara alveare*, Con., Adams' Genera i. p. 306.  
*Megara torquata*, Lea, Adams' Genera i. p. 306.  
*I. pernodosa*, Lea, Adams' Genera i. p. 299.
2. *P. Foremani*, Lea.  
*Gyrotoma Foremani*, Lea, ? Adams' Genera i. p. 306.
3. *P. undulatum*, Say.  
*Melania undulata*, Say, Brot, Mal. Blatt. ii. p. 106, July, 1860.  
*Megara undulata*, Say, Adams' Genera i. p. 306.
4. *P. excuratum*, Conrad.  
*Melania excurata*, Conr., Müller, Synopsis, p. 43, 1836.

\*Proceedings Acad. Nat. Sciences, Nov., 1863, p. 306; Feb., 1864, p. 24; April, 1864, p. 92.

†The species, published by Mr. Lea in the Proceedings of the Academy for 1864, are not all included in this paper, as the short diagnoses do not allow me to place them in a satisfactory manner. As soon as the full descriptions and figures are published in our Journal, I will indicate their proper places in this list.

6. *P. nobile*, Lea.  
*To nobilis*, Lea, Adams' Genera i. p. 299.
8. *P. canaliculatum*, Say.  
*To canaliculata*, Say, Morch, Yoldi, Cat. p. 56.  
*Ceriphasia canaliculata*, Say, Adams' Genera i. p. 297.  
*Melania conica*, Say, Sowerby, Mollusca, Fauna Boreali Americana, iii. p. 316, 1836.  
*Gyrotoma conica*, Say, Adams' Genera i. p. 305.  
*Melania Sayi*, Deshayes, Encyc. Meth. Vers. ii. p. 427, 1830.
9. *P. filum*, Lea.  
*Elimia filum*, Lea, Adams' Genera i. p. 300.
11. *P. olivaceum*, Lea.  
This species should follow No. 21.
- 16a. *P. trivittatum*, Lea.\*  
Synonymy, Part 1st, No. 79.
- 17a. *P. fastigiatum*, Anthony.  
Synonymy, Part 1st, No. 44.
28. *P. unciiale*, Haldeman.  
*P. unciiale*, Hald., Synonymy, Part 1st, No. 67.  
*P. bicostatum* and *rigidum*, Anth., *ibid.* No. 28.  
*P. sugillatum*, Reeve, *ibid.* No. 68.  
*G. oblita*, Lea, Synonymy, Part 2, No. 126.
29. *P. subulare*, Lea.  
*Ceriphasia subularis*, Lea, Adams' Genera i. p. 297.
- 29a. *P. intensum*, Anthony.  
*Melania intensa*, Anthony, Reeve, Monog. sp. 371. Brot, List, p. 30.
33. *P. annuliferum*, Conrad.  
*Melania annulifera*, Conr., Müller, Synopsis, p. 44.  
*Ceriphasia annulifera*, Conr., Adams' Genera i. p. 297.  
*Ceriphasia Ordiana*, Lea, *ibid.* p. 297.
38. *P. elevatum*, Say.  
*Elimia elevata*, Lea, Adams' Genera i. p. 300.  
*Ceriphasia elongata*, Lea, *ibid.* p. 297, not *Ceriph. elevata*, Say, of Chenu, Man. i. f. 1961.
40. *P. aratum*, Lea.  
*Ceriphasia exarata*, Lea, Adams' Genera i. p. 297.
44. *P. fastigiatum*, Anthony.  
Should be No. 17a.
49. *P. pyrenellum*, Conrad.  
*Melania pyrenella*, Conrad, Müller, Synopsis, p. 45.
51. *P. regulare*, Lea.  
*Ceriphasia regularis*, Lea, Adams' Genera i. p. 297.
55. *P. labiatum*, Lea.
- 55a. *P. pallidum*, Lea.†
57. *P. vestitum*, Conrad.‡

\* Perhaps — *Thornionii*.

† After a thorough examination of the specimens of *labiatum* and *pallidum*, I incline to the belief that they are distinct.

‡ *G. spinalis*, Lea, may be identical with this species.



- Melania vestita*, Conrad, Müller, Synopsis, p. 47.
- 57a. *P. lugubre*, Lea.  
*Melania lugubris*, Lea, Philos. Proc. iv. p. 166, August, 1845. Philos. Trans. x. p. 58, t. 9, f. 29. Obs. iv. p. 58. Binney, Check List, No. 164. Brot, List, p. 31.  
*Goniobasis spurca*, Lea, Synopsis, Part 2d, No. 177.  
*Ceriphasia spurca*, Lea, H. and A. Adams' Genera i. p. 297.
- 58a. *P. pictum*, Lea.  
*Melania picta*, Lea, Philos. Proc. ii. p. 82, Oct., 1841. Philos. Trans. ix. p. 19. Obs. iv. p. 19. Wheatley, Cat. Shells, U. S. p. 26. Binney, Check List, No. 205. Reeve, Monog. Melania, sp. 290.  
*Melania picturata*, Reeve, \* Errata to Monog. Melania. Brot, List, p. 38.
- 63a. *P. Ocoéense*, Lea.  
*Goniobasis Ocoéensis*, Lea, Synonymy, Part 2d, No. 181.
67. *P. unciata*, Haldeman.  
 Synonymy, Part 1st, = No. 28.
68. *P. sугillatum*, Reeve,  
 Synonymy, Part 1st, = No. 28.
76. *P. curvatum*, Lea.  
*Gyrotoma curvata*, Say, ? Adams' Genera i. p. 305.
79. *P. trivittatum*, Lea.  
 Synonymy, Part 1st, = No. 16a.
83. *P. opaca*, Anthony.  
*G. opaca, iostoma* and *nigrostoma*, Anthony, Synonymy, Part 2d, No. 119.  
*P. Tennesseeense*, Lea, Synonymy, Part 1st, No. 83.
- ANGITREMA, Haldeman.
1. *A. geniculata*, Haldeman.  
*Lithasia genicula*, Lea, Adams' Genera i. p. 308.
2. *A. salebrosa*, Conrad.  
*Melania salebrosa*, Conrad, Müller, Synopsis, p. 44.  
*Lithasia salebrosa*, Conrad, Adams' Genera i. p. 308.
5. *A. Jayana*, Lea.  
*Io Jayana*, Lea, Brot, Mal. Blatt. ii. p. 115, July, 1860.  
*Io robulina*, Anthony, Chenu, Manuel de Conchyl. i. f. 1976. Adams' Genera i. p. 299.
7. *A. armigera*, Say.  
*Io armigera*, Say, Adams' Genera i. p. 299.
8. *A. Duttoniana*, Lea.  
*Io Duttoniana*, Lea, Chenu, Man. de Conchyl. i. f. 1974. Adams' Genera i. p. 299.
9. *A. stygia*, Say.  
*Io tuberculata*, Lea, Adams' Genera i. p. 299.
11. *A. lima*, Conrad.  
*Melania lima*, Conr. Müller, Synopsis, p. 46.  
*Megara lima*, Conr., Adams' Genera i. p. 306.
12. *A. verrucosa*, Rafinesque.  
*Potadoma depygis*, Say, Chenu, Manuel de Conchyl. i. f. 1970.  
*Lithasia semigranulosa*, Deshayes, Adams' Genera i. p. 308.

\* As a *Pleurocera*, the name of *picta* is not preoccupied.

## LITHASIA, Haldeman.

1. *L. fuliginosa*, Lea.  
*Leptoxis fuliginosa*, Lea, Adams' Genera i. p. 307.
2. *L. Florentiana*, Lea.  
*Io Florentiana*, Lea, H. and A. Adams' Genera i. p. 299.
9. *L. nucleola*, Anthony.  
*L. obliqua*, Anthony, Synonymy, Part 1st, No. 14.
11. *L. obovata*, Say.  
*Lithasia obovata*, Say, Adams' Genera i. p. 308.  
*Leptoxis Hildrethiana*, Lea, Adams' Genera i. p. 307.
14. *L. obliqua*, Anthony.  
Synonymy, Part 1st, = *L. nucleola*, Anthony, No. 9.

## STREPHOBASIS, Lea.

1. *S. curta*, Haldeman.  
*Megara solida*, Lea, Adams' Genera i. p. 306.
2. *S. pumila*, Lea.  
*Megara pumila*, Lea, Adams' Genera i. p. 306.
8. *S. biteniata*, Conrad.  
*Melania biteniata*, Conrad, Müller, Synopsis, p. 45.

## GONIOBASIS, Lea.

2. *G. gratiosa*, Lea.
- 2a. *G. lachryma*, Anthony.  
Both=EURYCELON.
3. *G. gibberosa*, Lea.  
=EURYCELON.
4. *G. nubila*, Lea.  
=EURYCELON.
6. *G. Hydeii*, Conrad.  
*Melania Hydeii*, Conrad, Müller, Synopsis, p. 44.
8. *G. caelatura*, Conrad.
- 8a. *G. Stewardsoniana*, Lea.\*
- 8b. *G. flavescens*, Lea.†  
*Goniobasis flavescens*, Lea, Proc. Acad. Nat. Sciences, p. 271, 1862—Journal  
Acad. Nat. Sci., v. pt. 3, p. 339, t. 38, f. 202, March, 1863. Obs. ix. p. 161.
10. *G. catenaria*, Say.  
*Elimia catenaria*, Lea, Adams' Genera i. p. 300.
11. *G. catenoides*, Lea.  
*Elimia catenoides*, Lea, Adams' Genera i. p. 300.
14. *G. Boykiniana*, Lea.  
*Elimia Boykiniana*, Lea, Adams' Genera i. p. 300.  
*Juga Troostiana*, Lea, Chenu, Man. de Conchyl. i. f. 2017.
22. *G. carinifera*, Lamarck.  
*Elimia bella*, Conrad, Adams' Genera i. p. 300.

\*Differs from *G. caelatura* in color, being dark green. It is also a more inflated species, with shorter spire.

†Nearly allied to *caelatura*, but is narrower, more cylindrical and lighter in color.

- 22a. *G. abbreviata*, Anthony.  
*Melania abbreviata*, Anth., Bost. Proc., iii. p. 360, Dec., 1850. Binney, Check List, No. 433. Reeve, Monog. *Melania*, sp. 424.  
*Melania elegantula*, Anthony, Ann. N. Y. Lyc., vi. p. 103, t. 3, f. 2, Mar., 1854. Binney, Check List, No. 96. Brot. List, p. 32. Reeve, Monog. *Melania* sp. 346.  
*Melania coronilla*, Anth., Ann. Lyc., N. H., New York, vi. p. 126, t. 3, f. 27, Mar., 1854. Binney, Check List, No. 69. Brot. List, p. 32, Reeve, Monog. Mel., sp. 418.  
*Melania chalybea*, Anth., Brot. List, p. 37.
- 22b. *G. vesicula*, Lea.  
 Synonymy, Part 2, No. 41.
25. *G. substricta*, Haldeman.  
 Synonymy, Part 2—No. 31. *G. obtusa*, Lea.
28. *G. carinocostata*, Lea.  
*Elimia carinocostata*, Lea, Adams' Genera, i. p. 300.
- 28a. *G. strenua*, Lea.  
*G. Leidyana*, Lea.  
*G. carinocostata*, Lea, Synonymy, Part 2.
- 28b. *G. perstriata*, Lea.  
 Synonymy, Part 2, No. 73.
29. *G. Lecontiana*, Lea.  
*Melasma Lecontiana*, Lea, Adams' Genera i. p. 300.
30. *G. cadus*, Lea.  
 Synonymy, Part 2=*G. obtusa*, Lea, No. 31.
31. *G. obtusa*, Lea.  
*G. substricta*, Haldeman, Synonymy, Part 2, No. 25.  
*G. cadus*, Lea, Synonymy, Part 2, No. 30.
34. *G. Christyi*, Lea, is a Synonym of No. 37.
37. *G. interrupta*, Haldeman.  
*G. Christyi*, Lea. *G. instabilis*, Lea, Synonymy, Part 2, No. 34.  
*G. ornatella*, Lea, is a Synonym, of No. 39.
39. *G. formosa*, Conrad.  
*G. ornatella*, Lea, Synonymy, Part 2, No. 37.
41. *G. vesicula*, Lea.  
 See No. 22, b.
43. *G. laqueta*, Say.  
*Melasma laqueata*, Say, Adams' Genera i. p. 300.
47. *G. gracilis*, Lea.  
*Potadoma gracilis*, Lea, H. and A. Adams' Genera i. p. 299.
53. *G. blanda*, Lea.  
*Melasma blanda*, Lea, Adams' Genera i. p. 300.
54. *G. nitens*, Lea.  
*Melasma nitens*, Lea, Adams' Genera i. p. 300.
55. *G. mutata*, Brot.\*
59. *G. Curreyana*, Lea.  
*Melasma Curreyana*, Lea, Adams' Genera i. p. 300.

\*Much resembles *G. difformis*, Lea, No. 81.

61. *G. Deshayesiana*, Lea.  
*Melasma plicatula*, Lea, Adams' Genera i. p. 300.  
*Melasma Deshayesiana*, Lea, Adams' Genera i. p. 300.
- 69a. *G. Lindsleyi*,\* Lea.  
 Syn. of *dislocata*, Rav., Part 2, Synonymy, No. 69.
72. *G. nassula*, Conrad.  
*Melania nassula*, Conr., Müller, Synopsis, p. 46.  
*G. Edgariana*, Lea, Synonymy, Part 2, No. 77.  
*Melasma Edgariana*, Lea, Adams' Genera i. p. 300.
75. *G. costulata*, Lea.  
*Melasma costulata*, Lea, Adams' Genera i. p. 300.
77. *G. Edgariana*, Lea.  
 Vide, No. 72.
78. *G. caliginosa*, Lea.  
*Elimia caliginosa*, Lea, Adams' Genera i. p. 300.
79. *G. nodulosa*, Lea.  
*Elimia nodulosa*, Lea, Adams' Genera, No. 300.
80. *G. glauca*, Anthony.  
 = *G. athleta*, Anthony, No. 86.
84. *G. cancellata*, Say.  
*Elimia cancellata*, Say, Adams' Genera i. No. 84.
85. *G. circincta*, Lea.  
*Juga circincta*, Lea, Adams' Genera i. p. 294.
86. *G. athleta*, Anthony.  
*G. glauca*, Anthony, Synonymy, Part 2, No. 80.
88. *G. striatula*, Lea.  
*Juga striata*, Lea, Adams' Genera i. p. 304.
91. *G. crebicosata*, Lea.  
*Melasma crebicosata*, Lea, Adams' Genera i. p. 300.
92. *G. comma*, Conrad.  
*Melania comma*, Conr., Müller, Synopsis, p. 45.  
*Melasma comma*, Conr., Adams' Genera i. p. 300.
93. *G. acuta*, Lea.  
*Ceriphasia acuta*, Lea, Adams' Genera i. p. 297.
94. *G. subcylindracea*, Lea.  
*Potadoma subcylindracea*, Lea, Adams' Genera i. p. 299.
96. *G. concinna*, Lea.  
*Melasma concinna*, Lea, Adams' Genera i. p. 300.
103. *G. plicifera*, Lea.  
*Melania plicifera*, Lea, Troschel, Archiv für Naturgesch. ii. p. 227.  
*Melasma plicifera*, Adams' Genera i. p. 300.
104. *G. silicula*, Gould.  
*Juga silicula*, Gould, Adams' Genera i. p. 304.
108. *G. trochiformis*, Conrad.  
*Melania trochiformis*, Conr., Müller, Synopsis, p. 47.

\* The aperture is differently shaped from *dislocata*. The plicae are also more crowded, and decussated by one or two lines under the sutures.

- 111a. *G. expansa*, Lea.\*  
 118. *G. plebeius*, Anthony.  
     = *G. sordida*, Lea, No. 186.  
 119. *G. opaca*, Anthony.  
     = *Pleurocera opaca*, Anthony, No. 83.  
 123. *G. modesta*, Lea.†  
 124. *G. pagodiformis*, Anthony.  
     = *G. acutocarinata*, Lea, No. 127.  
 125. *G. Gerhardtii*, Lea.‡  
 126. *G. oblita*, Lea.  
     = *Pleurocera uncialis*, Hald., Synonymy, Part 1, No. 28.  
 127. *G. acutocarinata*, Lea.  
     *G. pagodiformis*, Anthony. *G. torulosa*, Anth., No. 124.  
     *Elimia acutocarinata*, Lea, Adams' Genera i. p. 300.  
 129. *G. Catawbaea*, Haldeman.  
     *Goniobasis Catawbaea*, Hald., Amer. Jour. Conch. vol. 1, No. 1,  
     Feb. 25, 1865.  
 132. *G. symmetrica*, Haldeman.  
     *Ceriphasia symmetrica*, Hald. Adams' Genera i. p. 297.  
 138. *G. congesta*, Conrad.  
     *Melania congesta*, Conr., Müller, Synopsis, p. 43.  
 139. *G. auriculæformis*, Lea.  
     *Megara auriculæformis*, Lea, Adams' Genera i. p. 306.  
 140. *G. Nickliniana*, Lea.  
     *Leptoxis Nickliniana*, Lea, Adams' Genera i. p. 307.  
 143. *G. ebenum*, Lea.§  
     *Nitocris ebena*, Lea, Adams' Genera i. p. 308.  
     *Melania brunnea*, Anth. = *G. sordida*, Lea, No. 186.  
 148. *G. graminea*, Haldeman.  
     *Goniobasis graminea*, Hald., American Journ. Conch. i. No. 1. Feb. 25, 1865.  
 150. *G. Vanuxemii*, Lea.  
     Changed to *G. Prestoniana*, Proc. Acad., 1864, p. 3, *Vanuxemii* being  
     preoccupied.  
     = *G. simplex*, Say, No. 157.  
 153. *G. abrupta*, Lea.  
     *Leptoxis abrupta*, Lea, Adams' Genera i. p. 307.  
 154. *G. depygis*, Say.  
     *Potadoma depygis*, Say, Adams' Genera i. p. 298.  
 155. *G. livescens*, Menke.  
     *Potadoma Niagarensis*, Lea, Adams' Genera i. p. 299.  
 157. *G. simplex*, Say.  
     *G. subsolida*, Lea, No. 186, excl. synonyms.

\*Very closely allied to, or perhaps—*G. Whitei*, No. 111.

†Perhaps—*Pleurocera lugubris*, Lea.

‡This is probably the same as *G. semigradata*, No. 27.

§Mr. Lea agrees with me in considering this species distinct from *isotoma*, Anth.; and also in making *brunnea* a synonym of *sordida* instead of *ebenum*.

- G. Vanuremii*, Lea, No. 150.  
*Pachycheilus simplex*, Say, Adams' Genera i. p. 298.  
*Potadoma Warderiana*, Lea, Adams' Genera i. p. 299, Chesu, Manuel, i. f. 1972.
158. *G. Potosiensis*, Lea.  
*Elimia Potosiensis*, Lea, H. and A. Adams' Genera i. p. 300.
- 160a. *G. virens*, Anthony.\*  
 Syn. of *G. Saffordi*. Synonymy, Part 2d, No. 160.
167. *G. cinerea*, Lea.†
170. *G. translucens*, Anthony.  
*Goniobasis translucens*, Anthony, Am. Journ. Conch. i., Feb. 25, 1865.
171. *G. ovoidea*, Lea.  
*Potadoma ovoideus*, Lea, Adams' Genera i. p. 299.
173. *G. quadricincta*, Lea.  
*Goniobasis quadricincta*, Lea, Proc. Acad. Nat. Sci., Apr. 1864, p. 112.
177. *G. spuroa*, Lea.  
 = *Pleurocera*, No. 57a.
181. *G. Ocoënsis*, Lea.  
*Potadoma Ocoënsis*, Lea, Adams' Genera i. p. 299. = *Pleurocera*, No. 63a.
184. *G. Estabrookii*, Lea.  
 = *G. dabiosa*.
186. *G. subsolida*, Lea.  
 = *G. simplex*, Say, No. 157.  
*Potadoma subsolida*, Lea, H. and A. Adams' Genera i. p. 299.
- 186a. *G. sordida*, Lea.  
*Potadoma sordida*, Lea, H. and A. Adams' Genera i. p. 299.  
*G. plebeia*, Anth., Synonymy, Part 2d, No. 118.  
*G. brunnea*, Anth., Synonymy, Part 2d, No. 143.
187. *G. clavaeformis*, Lea.  
*Melasma clavaeformis*, Lea, H. and A. Adams' Genera i. p. 300.
191. *G. adusta*, Anthony.  
*G. Cumberlandiensis*, Lea, Synonymy, Part 2d, No. 189.  
*G. funebris*, Anthony, Synonymy, Part 2d, No. 190.
193. *G. dubiosa*, Lea,  
*G. Estabrookii*, Lea, Synonymy, Part 2d, No. 184.
194. *G. laevigata*, Lea.  
*Potadoma laevigata*, Lea, H. and A. Adams' Genera i. p. 299.
195. *G. interlineata*, Anthony.  
*Goniobasis interlineata*, Anthony, Am. Jour. Conch. vol. i., Feb. 25, 1865.
196. *G. Ohiensis*, Lea.‡
197. *G. brevispira*, Anthony.  
*Melasma brevispira*, Anth., Adams' Genera i. p. 300.

\* Appears to be distinct from *G. Saffordi*. The shell is less solid, the aperture is not exactly of the same form, and the color is lighter and more brilliant.

† Most likely the locality given for this species is incorrect. It is probably identical with *psalobella*, Anthony.

‡ Probably — *G. semicarinata*, Say, No. 193.

198. *G. semicarinata*, Say.  
*Juga exilis*, Hald., Adams' Genera i. p. 304.  
*Ceriphasia Kirtlandiana*, Adams' Genera i. p. 297.  
*Potadoma inornatus*, Adams' Genera i. p. 299.
199. *G. Haldemani*, Tryon.  
*Goniobasis Haldemani*, Tryon, Am. Journ. Conch. i., Feb. 25, 1865.
203. *G. Alexandrensis*, Lea.\*  
*Ceriphasia Alexandrensis*, Lea, Adams' Genera i. p. 297.
204. *G. Haleiana*, Lea.  
*Ceriphasia Haleiana*, Lea, Adams' Genera i. p. 297.
208. *G. proxima*, Say.  
*Juga proxima*, Say, Adams' Genera i. p. 304.
- 208a. *G. rufescens*, Lea.†  
*Potadoma rufescens*, Lea, Adams' Genera i. p. 299.
209. *G. Virginia*, Gmel.  
*Buccinum Virginia*, Gmel. Syst. Nat. p. 3505. Schröter, Einleit. i. p. 414, 1783. Martini, Berlin Mag. iv. p. 348, t. 10, f. 48. Schreibers, Einleit. Conchyl. t. 113, f. 7.  
*Melania Virginia*, Say, Villa., Cat. Syst. p. 36, 1841.  
*Io Virginia*, Say, Moroh, Yoldi Cat. p. 56.  
*Ceriphasia Virginia*, Gmel., Adams' Genera i. p. 297.  
*Juga Virginia*, Say, Adams' Genera i. p. 304.  
*Juga multilineata*, Say, Adams' Genera i. p. 304.
210. *G. Sulcosa*, Lea.  
*Ceriphasia sulcosa*, Lea, Adams' Genera i. p. 297.
211. *G. Buddii*, Lea.  
*Juga Buddii*, Say, H. and A. Adams' Genera i. p. 304.
212. *G. Troostiana*, Lea.  
*Melania Troostiana*, Lea, Troschel, Archiv für Naturgesch. ii. p. 227.  
*Juga Troostiana*, Lea, Adams' Genera i. p. 304.
- J. Heavy, pupaeform or cylindrical species.*
217. *G. cylindracea*, Conrad.  
*Melania cylindracea*, Con., New Fresh-Water Shells, p. 55, t. 8, f. 10, 1834.  
Müller, Synopsis, p. 47, 1836. Binney, Check List, No. 84.  
*Melania cylindrica*, Con., Wheatley, Cat. Shells, U. S., p. 25. Reeve, Monog. Melania, sp. 311. Brot, List, p. 32.  
*Melania oppugnata*, Lea, Philos. Trans. x. p. 300, t. 30, f. 9. Observations, v. p. 56. Binney, Check List, No. 190.
218. *G. pupoidea*, Anthony.‡  
*Melania pupoidea*, Anthony, Ann. Lyc. Nat. Hist. N. Y., vi. p. 104, t. 3, f. 3, April, 1854. Brot, List, p. 33. Binney, Check List, No. 224. Reeve, Monog. Melania, sp. 249.  
*Melania propinqua*, Lea, Proc. Acad. Nat. Sci., p. 119, 1861.  
*Goniobasis propinqua*, Lea, Journ. Acad. Nat. Sci., v. pt. 3, p. 234, t. 34, f. 29, March, 1863. Obs. ix. p. 56.

\*May be a *Pleurocera*.

†This is a longer and narrower species than *G. proxima*, the color is also darker.

‡Without the large series of specimens before me, I should have acquiesced in the institution of *propinqua* as a distinct species; but I find every grade of form between the two. The shorter forms approach closely to *olivula*, Con., with which they have been confounded. They are distinguished by difference in color, and principally of texture, *olivula* being much heavier.

219. *G. lita*, Lea.\*  
*Melania lita*, Lea, Proc. Acad. Nat. Sciences, 1861, p. 121.  
*Goniobasis lita*, Lea, Journ. Acad. Nat. Sci., v. pt. 3, p. 239, t. 34, f. 40,  
 March, 1863. Obs. ix. p. 61.
220. *G. fallax*, Lea.  
*Melania fallax*, Lea, Proc. Acad. Nat. Sciences, 1861, p. 120.  
*Goniobasis fallax*, Lea, Journ. Acad. Nat. Sci. v. pt. 3, p. 231, t. 34, f. 24,  
 March, 1863. Obs. ix. p. 53.
221. *G. inosculata*, Lea.†  
*Goniobasis inosculata*, Lea, Proc. Acad. Nat. Sci. p. 263, 1862. Journ. Acad.  
 Nat. Sci. v. pt. 3, p. 296, t. 37, f. 126, March, 1863. Obs. ix. p. 118.
222. *G. Alabamensis*, Lea.  
*Melania Alabamensis*, Lea, Proc. Acad. Nat. Sci. 1861, p. 121.  
*Goniobasis Alabamensis*, Lea, Jour. Acad. Nat. Sci. v. pt. 3, p. 232, t. 34, f.  
 26, March, 1863. Obs. ix. p. 54.
223. *G. rara*, Lea.  
*Melania rara*, Lea, Proc. Acad. Nat. Sci. p. 121, 1861.  
*Goniobasis rara*, Lea, Journ. Acad. Nat. Sci. v. pt. 3, p. 220, t. 34, f. 3,  
 March, 1863: Obs. ix. p. 42.
224. *G. punicea*, Lea.‡  
*Melania punicea*, Lea, Proc. Acad. Nat. Sci., p. 119, 1861.  
*Goniobasis punicea*, Lea, Journ. Acad. Nat. Sci. v. pt. 3, p. 232, t. 34, f. 27,  
 March, 1863. Obs. ix. p. 54.
225. *G. pudica*, Lea.  
*Melania pudica*, Lea, Proc. Acad. Nat. Sci. v. pt. 3, p. 222, t. 34, f. 7, Mar.  
 1863. Obs. ix.
226. *G. fabalis*, Lea.  
*Goniobasis fabalis*, Lea, Proc. Acad. Nat. Sci. p. 266, 1862. Journ. Acad.  
 Nat. Sci. v. pt. 3, p. 311, t. 37, f. 154, March, 1863. Obs. ix. p. 133.
227. *G. Shelbyensis*, Lea §  
*Melania Shelbyensis*, Lea, Proc. Acad. Nat. Sci. p. 121, 1861.  
*Goniobasis Shelbyensis*, Lea, Journ. Acad. Nat. Sci. v. pt. 3, p. 228, t. 34, f.  
 18, March, 1863. Obs. ix. p. 50.
228. *G. fumea*, Lea.  
*Melania fumea*, Lea, Proc. Acad. Nat. Sci. 1861, p. 123.  
*Goniobasis fumea*, Lea, Journ. Acad. Nat. Sci. v. pt. 3, p. 222, t. 34, f. 6,  
 March, 1863. Obs. ix. p. 44.
229. *G. aequa*, Lea.  
*Melania aequa*, Lea, Proc. Acad. Nat. Sci. 1861, p. 122.  
*Goniobasis aequa*, Lea, Journ. Acad. Nat. Sci. v. pt. 3, p. 240, t. 34, f. 41,  
 March, 1863. Obs. ix. p. 62.
230. *G. solidula*, Lea.  
*Melania solidula*, Lea, Proc. Acad. Nat. Sci. 1861, p. 121.  
*Goniobasis solidula*, Lea, Journ. Acad. Nat. Sci. v. pt. 3, p. 230, t. 34, f. 23.  
 Obs. ix. p. 52.

\*I doubt whether this is distinct from *G. Haystiana*. In all the specimens I have examined, the aperture is white within, instead of purple as described by Mr. Lea.

† The whorls are more convex and brighter in color than *G. fallax*. This species is constantly ornamented by four dark bands.

‡ Very closely allied to *pudica*, if not identical with that species.

§ Differs from *pudica* in the form of the aperture, the whorls are also flatter.



231. *G. olivula*, Conrad.  
*Melania olivula*, Con., Am. Journ. Science, 1st Series, xxv. p. 342, t. 1, f. 13, Jan., 1834. Müller, Synopsis, p. 42, 1836. Wheatley, Cat. Shells, U. S., 26. DeKay, Moll. New York, p. 98. Jay, Cat. Shells, 4th Edit. p. 274. Reeve, Monog. *Melania*, sp. 455.\* Binney, Check List, No. 188. Brot, List, p. 33. Hanley, Conch. Miscellany, t. 1, f. 2.  
*Megara olivula*, Con., Chenu, Manuel, i. f. 2027. Adams' Genera i. p. 306.  
*Melania olivata*, Con., Jay, Cat. 3d Edit. p. 45. Catlow, Conch. Nomencl. p. 188.  
*Melania propria*, Lea, Proc. Acad. Nat. Sciences, 1861, p. 123.†  
*Goniobasis lepida*, Lea, Journ. Acad. Nat. Sciences, v. pt. 3, p. 227, t. 34, f. 17, March, 1863. Obs. ix. p. 49.
232. *G. fascinans*, Lea.  
*Melania fascinans*, Lea, Proc. Acad. Nat. Sciences, p. 119, 1861.  
*Goniobasis fascinans*, Lea, Journ. Acad. Nat. Sci. v. pt. 3, p. 229, t. 34, f. 20, March, 1863. Obs. ix. p. 51.
233. *G. Showalterii*, Lea.  
*Melania Showalterii*, Lea, Proc. Acad. Nat. Sciences, 1861, p. 120.  
*Goniobasis Showalterii*, Lea, Journ. Acad. Nat. Sci. v. pt. 3, p. 220, t. 34, f. 4. Obs. ix. p. 42.
234. *G. clausa*, Lea.  
*Melania clausa*, Lea, Proc. Acad. Nat. Sciences, 1861, p. 120.  
*Goniobasis clausa*, Lea, Journ. Acad. Nat. Sci. v. pt. 3, p. 231, t. 34, f. 25, March, 1863. Obs. ix. p. 53.
235. *G. crepera*, Lea.  
*Melania crepera*, Lea, Proc. Acad. Nat. Sci. 1861, p. 123.  
*Goniobasis crepera*, Lea, Journ. Acad. Nat. Sci. v. pt. 3, p. 240, t. 34, f. 42, March, 1863. Obs. ix. p. 62.
236. *G. abscida*, Anthony.  
*Melania abscida*, Anthony, Proc. Acad. Nat. Sciences, 1860, p. 56. Binney, Check List, No. 435. Brot, List, p. 32. Reeve, Monog. *Melania*, sp. 395.
237. *G. Vanuxemiana*, Lea.  
*Melania Vanuxemiana*, Lea, Proc. Philos. Soc. ii. p. 242, Dec., 1842. Philos. Trans. ix. p. 25. Obs. ix. p. 25. Reeve, Monog. *Melania*, sp. 453. Brot, List, p. 33.  
*Melania Vanuxemensis*, Lea, Wheatley, Cat. Shells, U. S., p. 27. Binney, Check List, No. 283.  
*Megara Vanuxemiana*, Lea, Adams' Genera i. p. 306.
238. *G. Coosaensis*, Lea.‡  
*Melania Coosaensis*, Lea, Proc. Acad. Nat. Sci. 1861, p. 118.  
*Goniobasis Coosaensis*, Lea, Journ. Acad. Nat. Sciences, v. pt. 3, p. 234, t. 34, f. 30, March, 1863. Obs. ix. p. 56.
238. *G. rubicunda*, Lea.  
*Melania rubicunda*, Lea, Proc. Acad. Nat. Sciences, 1861, p. 118.  
*Goniobasis rubicunda*, Lea, Journ. Acad. Nat. Sci., v. pt. 3, p. 235 t. 34, f. 32, March, 1863. Obs. ix. p. 57.
240. *G. Haysiana*, Lea.  
*Melania Haysiana*, Lea, Philos. Proc. ii. p. 242, Dec., 1842. Philos. Trans.

\* Reeve figures for this shell also sp. 309, but the figure does not represent the species.

† Preoccupied. *Showalterii* and *fascinans* are also probably synonyms of *olivula*.‡ Differs from *G. Haysiana* in the form of the aperture.

- ix. p. 25. Obs. iv. p. 25. Wheatley, Cat. Shells, U. S., p. 25. Jay, Cat. Shells, 4th Edit. p. 273. Binney, Check List, No. 137. Brot, List, p. 32. Brot, Mal. Blatt. ii. p. 108, July, 1860.\* Reeve, Monog. Melania, sp. 310. Hanley, Conch. Miscel. Melania, t. 1, f. 6.  
*Megara Haysiana*, Lea, Chenu, Manuel, i. f. 1981. Adams' Genera i. p. 306.
241. *G. arcata*, Lea.  
*Melania arcata*, Lea, Philos. Proc. iv. p. 166. Philos. Trans. x. p. 64, t. 9. f. 46. Obs. iv. p. 64. Binney, Check List, No. 20. Brot, List, p. 32.  
*Megara arcata*, Lea, Chenu, Manuel, i. f. 2024. Adams' Genera i. f. 306.
242. *G. ampla*, Anthony.  
*Melania ampla*, Anthony, Ann. N. Y. Lyceum, vi. p. 93, t. 2, f. 12, 1854. Binney, Check List, No. 13. Brot, List, p. 39. Reeve, Monog. Melania, sp. 312.  
*Melania Hartmaniana*, Lea, Proc. Acad. Nat. Sciences, 1861.  
*Goniobasis Hartmanii*, Lea, Journ. Acad. Nat. Sci. v. pt. 3, p. 218, t. 34, f. 1, 1863. Obs. ix. p. 40.
243. *G. mellea*, Lea.  
*Melania mellea*, Lea, Proc. Acad. Nat. Sciences, 1861, p. 120.  
*Goniobasis mellea*, Lea, Journ. Acad. Nat. Sci. v. pt. 3, p. 224, t. 34, f. 10, 1863. Obs. ix. p. 46.
244. *G. ambusta*, Anthony.  
*Melania ambusta*, Anthony, Ann. Lyc. Nat. Hist. vi. p. 94, t. 2, f. 13, 1854. Binney, Check List, No. 12. Brot, List, p. 39. Reeve, Monog. Melania, sp. 352.
245. *G. laeta*, Jay.  
*Melania laeta*, Jay, Cat. Shells, 3d Edit. p. 122, t. 7, f. 11, 1839. Jay, Cat. Shells, 4th Edit. p. 274. Wheatley, Cat. Shells, U. S., p. 26. Binney, Check List, No. 156. Catlow, Conch. Nomencl. p. 187. Brot, List, p. 32.  
*Melania robusta*, Lea, Philos. Proc. ii. p. 83, October, 1841. Philos. Trans. ix. p. 19. Obs. iv. p. 19. Wheatley, Cat. Shells, U. S., p. 26. Binney, Check List, No. 231.  
*Melatoma Buddii*, Lea, † Reeve, Monog. Melatoma, sp. 3.  
*Melania tenuolata*, † Anthony, Proc. Acad. Nat. Sciences, 1860, p. 59. Binney, Check List, No. 263. Brot, List, p. 31. Reeve, Monog. Melania, sp. 392.
246. *G. harpa*, Lea.  
*Melania harpa*, Lea, Philos. Proc. iv. p. 166, August, 1845. Philos. Trans. x. p. 64, t. 9, f. 45. Obs. iv. p. 64. Binney, Check List, No. 135. Brot, List, p. 32. Reeve, Monog. Melania, sp. 313, 314.  
*Megara harpa*, Lea, Adams' Genera i. p. 306.  
*Melania textilosa*, Anthony, ‡ Ann. Lyc. Nat. Hist. vi. p. 101, t. 2, f. 20, 1854. Binney, Check List, No. 270. Brot, List, p. 40. Reeve, Monog. Melania, sp. 391.
247. *G. oliva*, Lea.¶

\* Dr. Brot considers *arcata*, *robusta*, *brevis* and *basalis* synonyms.

† It is curious that Mr. Reeve has figured and described this shell for the *Schizostoma* (*Melatoma*), *Buddii*, Lea.

‡ Half grown shell. It presents a very different appearance from the adult.

§ Half grown shell.

¶ This shell is narrower than *G. laeta*, resembling *harpa* in form; but the aperture is wider and more rounded below. It is very closely allied to *G. excavata*,—which is a smooth species, however.

- Melania oliva*, Lea, Philos. Proc. ii. p. 242, 1842. Philos. Trans., ix. p. 27.  
Obs. iv. p. 127. Wheatley, Cat. Shells U. S., p. 26. Binney, Check List,  
No. 187. Brot, List, p. 33.  
*Megara oliva*, Lea, Adams' Genera i. p. 306.
248. *G. proteus*, Lea.  
*Melania proteus*, Lea, Philos. Proc. iv. p. 166, 1845. Philos. Trans., x. p.  
57, t. 9, f. 28. Obs. iv. p. 57. Binney, Check List, No. 219. Brot, List, p. 33.  
*Juga proteus*, Lea, Adams' Genera i. p. 304.
249. *G. grisea*, Anthony.  
*Melania grisea*, Anthony, Proc. Acad. Nat. Sciences, 1860, p. 61. Reeve,  
Monog. Melania, sp. 390. Brot, List, p. 32.
250. *G. culta*, Lea.  
*Melania culta*, Lea, Proc. Acad. Nat. Sciences, p. 121, 1861.  
*Goniobasis culta*, Lea, Jour. Acad. Nat. Sci., v. p. 13, p. 237, t. 34, f. 36.  
Mar., 1863. Obs. ix. p. 59.  
*Melania suavis*,\* Lea, Proc. Acad. Nat. Sci., p. 169, 1861.  
*Goniobasis suavis*, Lea, Jour. Acad. Nat. Sci., v. pt. 3, p. 228 t. 34, f. 19.  
Mar., 1863. Obs. ix. p. 50.
251. *G. luteola*, Lea.  
*Melania luteola*, Lea, Proc. Acad. Nat. Sci., p. 119, 1861.  
*Goniobasis luteola*, Lea, Jour. Acad. Nat. Sci., v. pt. 3, p. 230, t. 34, f. 22,  
Mar., 1863. Obs. ix. p. 52.  
*Melania straminea*,† Lea, Proc. Acad. Nat. Sci., 1861, p. 121.  
*Goniobasis straminea*, Lea, Jour. Acad. Nat. Sci., v. pt. 3, p. 227, t. 34, f.  
16, Mar., 1863. Obs. ix. p. 49.
252. *G. gravida*, Anthony.  
*Melania gravida*, Anth., Proc. Acad. Nat. Sci. p. 59, Feb., 1860. Reeve,  
Monog. Melania. Brot, List.
253. *G. germana*, Anthony.  
*Melania germana*, Anth., Proc. Acad. Nat. Sci. p. 61, Feb., 1860. Binney,  
Check List, No. 120. Brot, List, p. 40. Reeve, Monog. Melania, sp. 383.
254. *G. variata*, Lea.  
*Melania variata*, Lea, Proc. Acad. Nat. Sci. p. 119, 1861.  
*Goniobasis variata*, Lea, Jour. Acad. Nat. Sci. v. pt. 3, p. 224, t. 34, f. 11,  
March, 1863. Obs. ix. p. 46.
255. *G. ovalis*, Lea.  
*Melania ovalis*, Lea, Philos. Proc. ii. p. 242, Dec. 1842. Philos. Trans. ix.  
p. 25. Obs. ix. p. 25. Wheatley, Cat. Shells U. S. p. 26. Binney, Check  
List, No. 192. Reeve, Monog. Melania, sp. 448 and sp. 309.‡  
*Megara ovalis*, Lea, Adams' Genera i. p. 306.  
*Melania copiosa*, Lea, Proc. Acad. Nat. Sci. p. 122, 1861.  
*Goniobasis copiosa*, Lea, Jour. Acad. Nat. Sci. v. pt. 3, p. 239, t. 34, f. 39.  
Obs. ix. p. 61.  
*Melania orbicula*, Lea, Proc. Acad. Nat. Sci. p. 118, 1861.  
*Goniobasis orbicula*, Lea, Jour. Acad. Nat. Sci. v. pt. 3, p. 238, t. 34, f. 37,  
March, 1863. Obs. ix. p. 60.
256. *G. virgulata*, Lea.  
*Melania virgulata*,† Lea, Proc. Acad. Nat. Sci. p. 119, 1861.

\* Young shell.

† Young shell.

‡ Figured as *ovicula*, Conr, but name corrected in Errata.

- Goniobasis virgulata*, Lea, Jour. Acad. Nat. Sci. v. pt. 3, p. 223, t. 34, f. 9, March, 1863. Obs. ix. p. 45.  
*Melania glandaria*,\* Lea, Proc. Acad. Nat. Sci. p. 120, 1861.  
*Goniobasis glandaria*, Lea, Jour. Acad. Nat. Sci. v. pt. 3, p. 226, t. 34, f. 14, March, 1863. Obs. ix. p. 48.
257. *G. clara*, Anthony.  
*Melania clara*, Anth., Ann. N. Y. Lyc. vi. p. 119, t. 3, f. 19, March, 1854. Binney, Check List, No. 55. Brot, List, p. 32.
258. *G. inflata*, Haldeman.†  
*Melania inflata*, Hald., Cover of No. 3, Monog. Linniaides, March, 1841. Binney, Check List, No. 146. Brot, List, p. 40. Reeve, Monog. Melania, sp. 410.
259. *G. fusiformis*, Lea. ‡  
*Melania fusiformis*, Lea, Philos. Proc. ii. p. 12, Feb., 1841. Philos. Trans., viii. p. 167, t. 5, f. 9. Obs. iii. p. 5. DeKay, Moll. N. Y., p. 93. Troost. Cat. Shells Tenn. Wheatley, Cat. Shells U. S., p. 25. Binney, Check List, No. 117. Catlow, Conch. Nomencl., p. 186. Brot, List, p. 40.
260. *G. bellula*, Lea.  
*Melania bellula*, Lea, Proc. Acad. Nat. Sci., p. 122, 1861.  
*Goniobasis bellula*, Lea, Jour. Acad. Nat. Sci., v. pt. 3, p. 237, t. 34, f. 35, Mar., 1863. Obs. ix. p. 59.
261. *G. calculoides*, Lea.  
*Melania calculoides*, Lea, Proc. Acad. Nat. Sci., p. 118, 1861.  
*Goniobasis calculoides*, Lea, Jour. Acad. Nat. Sci. v. pt. 3, p. 238, t. 34, f. 38, Mar., 1863. Obs. ix. p. 60.
262. *G. basalis*, Lea, §  
*Melania basalis*, Lea, Philos. Proc. iv. p. 166. Philos. Trans., x. p. 59, t. 9, f. 33. Obs. iv. p. 59. Binney, Check List, No. 28. Brot, List, p. 32. Reeve, Monog. Melania, sp. 471.  
*Anculotis basalis*, Lea, Reeve, Monog. Anculotus, t. 5, f. 40.  
*Megara basalis*, Lea, Adams' Genera I. p. 306.
263. *G. Lewisii*, Lea.  
*Melania Lewisii*, Lea, Proc. Acad. Nat. Sci. p. 118, 1861.  
*Goniobasis Lewisii*, Lea, Jour. Acad. Nat. Sci. v. pt. 3, p. 243, t. 35, f. 46, Mar., 1863. Obs. ix. p. 65.
264. *G. ellipsoides*, Lea.  
*Melania gracilior*, Lea, || Proc. Acad. Nat. Sci. 1861, p. 118.  
*Goniobasis ellipsoides*, Lea, Jour. Acad. Nat. Sci. v. pt. 3, p. 234, t. 34, f. 31, Mar., 1863. Obs. ix. p. 56.
265. *G. elliptica*, Lea.  
*Melania elliptica*, Lea, Proc. Acad. Nat. Sci. p. 118, 1861.  
*Goniobasis elliptica*, Lea, Jour. Acad. Nat. Sci. v. pt. 3, p. 225, t. 34, f. 13, Mar., 1863. Obs. ix. p. 47.
266. *G. bullula*, Lea.  
*Melania bullula*, Lea, Proc. Acad. Nat. Sci. p. 121, 1861.

\* This is the young, and *glandaria* the adult shell of the same species.

† Differs from *G. virgulata* by its obtusely angled whorls and somewhat diamond-shaped aperture.

‡ Much like *G. ambusta* when young, but more inflated, and the aperture more obtusely rounded below.

§ Resembles *glandaria*, but is thinner, the outer lip is more expanded, and the aperture rather larger. It is closely allied also to *fusiformis*, Lea.

|| Preoccupied.

- Goniobasis bullula*, Lea, Jour. Acad. Nat. Sci. v. pt. 3, p. 221, Mar., 1863. Obs. ix. p. 43, t. 34, f. 5.
267. *G. excavata*, Anthony.\*  
*Melania excavata*, Anthony, Ann. Lye. N. Y., vi. p. 99, t. 2, f. 18, Mar., 1854. Binney, Check List, No. 102. Brot, List, p. 32. Reeve, Monog. *Melania*, sp. 385.
268. *G. purpurea*, Lea.  
*Melania purpurea*, Lea, Proc. Acad. Nat. Sci. p. 120.  
*Goniobasis purpurea*, Lea, Jour. Acad. Nat. Sci. v. pt. 3, p. 225, t. 34, f. 12, Mar., 1863. Obs. ix. p. 47.
269. *G. quadrivittata*, Lea.  
*Melania quadrivittata*, Lea, Proc. Acad. Nat. Sci. 1861, p. 119.  
*Goniobasis quadrivittata*, Lea, Jour. Acad. Nat. Sci. v. pt. 3, p. 226, Mar., 1863. Obs. ix. p. 48.
270. *G. propria*, Lea.  
*Melania propria*, Lea, Proc. Acad. Nat. Sci., p. 118, 1861.  
*Goniobasis propria*, Lea, Jour. Acad. Nat. Sci., v. pt. 3, p. 229, t. 34, f. 21, Mar., 1863. Obs. ix. p. 52.
271. *G. negata*, Lea.  
*Goniobasis negata*, Lea, Proc. Acad. Nat. Sci., p. 271, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 337, t. 38, f. 200, Mar. 1863. Obs. ix. p. 159.
272. *G. impressa*, Lea.  
*Melania impressa*, Lea, Philos. Proc. ii. p. 83, Oct. 1841. Philos. Trans., ix. p. 19. Obs. iv. p. 19. Wheatley, Cat. Shells U. S., p. 25. Jay, Cat. Shells, p. 274. Binney, Check List, No. 143. Brot, List, p. 32. Reeve, Monog. *Melania*, sp. 316, 349. Hanley, Conch. Miscel. *Melania*, t. 8, f. 69.  
*Megara impressa*, Lea, Chenu, Manuel i. f. 2023, Adams' Genera i. p. 306.  
*Melania crebristriata*, Lea, † Philos. Proc. iv. p. 166. Philos. Trans., x. p. 65, t. 9, f. 47. Obs. iv. p. 65. Binney, Check List, No. 75. Catlow, Conch. Nomencl., p. 186. Brot, List, p. 32.  
*Megara crebristriata*, Lea, Adams' Genera i. p. 306.
273. *G. pergrata*, Lea. ‡  
*Melania pergrata*, Lea, Proc. Acad. Nat. Sci., p. 122, 1861.  
*Goniobasis pergrata*, Lea, Jour. Acad. Nat. Sci. v. pt. 3, p. 243, Mar., 1863. Obs. ix. p. 65.
274. *G. capillaris*, Lea.  
*Melania capillaris*, Lea, Proc. Acad. Nat. Sci., p. 122, 1861.  
*Goniobasis capillaris*, Lea, Jour. Acad. Nat. Sci. v. pt. 3, p. 236, t. 34, f. 34, Mar., 1863. Obs. ix. p. 58.

## EURYOÆLON, Lea.

- Euryælon*, Lea, Proc. Acad. Nat. Sci., p. 3, Jan., 1864.
1. *E. umbonata*, Lea.  
*Goniobasis umbonata*, Lea, Proc. Acad. Nat. Sci., p. 3, 1864.
2. *E. Midas*, Lea.  
*Melania Midas*, Lea, Proc. Acad. Nat. Sci., p. 119, 1861.  
*Goniobasis Midas*, Lea, Jour. Acad. Nat. Sci., v. pt. 3, p. 233, t. 34, f. 28, Mar., 1863. Obs. ix. p. 55.
3. *E. gratiosa*, Lea.  
*Goniobasis gratiosa*, Lea, Synonymy, Part 2, No. 2.

\*Mr. Anthony's type specimen exhibits unmistakable evidence of diseased growth.

†The difference in the number of striae pointed out by Mr. Lea, is not a good distinctive character; they vary much in number on undoubted specimens of *impressa*. *G. crebristriata* is not full grown.

‡It has this is only a variety of *impressa*.

- 3a. *E. lachryma*, Anthony.  
*Goniobasis lachryma*, Anthony, Syn., Part 2, No. 2a.
4. *E. gibberosa*, Lea.  
*Goniobasis gibberosa*, Lea, Syn., Part 2, No. 3.
5. *E. nubila*, Lea.  
*Goniobasis nubila*, Lea, Syn., Part 2, No. 4.
6. *E. Anthonyi*, Budd.  
*Anculosa Anthonyi*, Budd., Syn., Part 3, No. 1.
7. *E. crassa*, Haldeman.  
*Anculosa crassa*, Hald., Syn., Part 3, No. 15.  
*Leptoxis crassa*, Hald., Adams' Genera i. p. 307.  
*Anculosa pisum*,\* Hald., Syn., Part 3, No. 19.  
*Leptoxis pisum*, Hald., Adams' Genera i. p. 307.
8. *E. turbinata*, Lea.  
*Anculosa turbinata*, Lea, Syn., Part 3, No. 33.

## MESESCHIZA, Lea.

- Meseschiza*, Lea, Proc. Acad. Nat. Sci., p. 2, Jan., 1864.
1. *M. Grosvenorii*, Lea.  
*Meseschiza Grosvenorii*, Lea, Proc. Acad. Nat. Sci., p. 2, Jan. 1864.

## SCHIZOSTOMA, Lea.

3. *S. ovoideum*, Shuttleworth.  
*Gyrotoma ovoidea*, Shutt., Adams' Genera i. p. 305.
4. *S. excisum*, Lea.  
*Gyrotoma excisa*, Lea, Adams' Genera i. p. 305.
7. *S. laciniatum*, Lea.  
*Gyrotoma laciniata*, Lea, Adams' Genera i. p. 305.
10. *S. cylindraceum*, Mighels.  
*Gyrotoma cylindracea*, Migh., Adams' Genera i. p. 305.
12. *S. curtum*, Mighels.  
*Gyrotoma curta*, Migh., Adams' Genera i. p. 305.
15. *S. pagoda*, Lea.  
*Gyrotoma pagoda*, Lea, Adams' Genera i. p. 305.
16. *S. pyramidatum*, Shuttleworth.  
*Gyrotoma pyramidatum*, Shutt., Adams' Genera i. p. 305.
20. *S. babylonicum*, Lea.  
*Gyrotoma babylonicum*, Lea, Adams' Genera i. p. 305.  
*Gyrotoma funiculata*, Lea, Adams' Genera i. p. 305.
23. *S. constrictum*, Lea.  
*Gyrotoma constricta*, Lea, Adams' Genera i. p. 305.
26. *S. incisum*, Lea.  
*Gyrotoma incisa*, Lea, Adams' Genera i. p. 305.

## ANCULOSA, Say.

1. *A. Anthonyi*, Budd.  
 = *Euryxylon*.
2. *A. plicata*, Conrad.  
*Anculotus plicatus*, Conrad, Müller, Synopsis, p. 40, 1836.  
*Leptoxis plicata*, Conrad, Adams' Genera i. p. 307.
5. *A. littorina*, Haldeman.  
*Melania pilula*, Lea, Adams' Genera i. p. 307.

\*Young shell.

6. *A. costata*, Anthony.  
*Nitocris costata*, Lea, H. and A. Adams' Genera i. p. 308.  
*Nitocris occidentalis*, Lea, Adams' Genera i. p. 308.
7. *A. rubiginosa*, Lea.  
*Anculosa rubiginosa*, Lea, Brot, Mal. Blatt., ii. p. 111, July, 1840.  
*Leptoxis rubiginosa*, Lea, Adams' Genera i. p. 307.  
*Leptoxis Griffithiana*, Lea, Adams' Genera i. p. 307.
8. *A. carinata*, Brug.\*  
*A. dissimilis*, Say, Synopsis, Part 3.  
*Bulimus carinatus*, Brug., Ency. Meth., vers. i. p. 301, 1792.  
*Nitocris dissimilis*, Say, Adams' Genera i. p. 308.  
*Leptoxis dissimilis*, Say, Chenu, Manuel, i. f. 2049—54.  
—Lister t. 111, f. 5 and t. 112, f. 6. Petiver, Gazophyl, t. 104, f. 67.  
*Nitocris carinata*, Lea, Adams' Genera i. p. 308.  
*Leptoxis variabilis*, Lea, Adams' Genera i. p. 307.  
*Anculotus nigrescens*, Conrad, Müller, Synopsis, p. 36, 1836.  
*Anculotus nigrescens*, Conrad, Adams' Genera i. p. 307.  
*Leptoxis trivittata*, DeKay, Adams' Genera i. p. 307.  
*Anculotus monodontoides*, Conrad, Müller, Synopsis, p. 41, 1836.  
*Nitocris monodontoides*, Conrad, Adams' Genera i. p. 308.  
*Nitocris dentata*, Couth., Adams' Genera i. p. 308.
9. *A. dilatata*, Conrad.  
*Nitocris dilatata*, Conrad, Adams' Genera i. p. 308.  
*Leptoxis dilatatus*, Conrad, Chenu, Manuel, i. f. 2043—5.  
*Nitocris Rogersii*, Conrad, Adams' Genera i. p. 308.  
*Nitocris Kirtlandianus*, Anthony, Adams' Genera i. p. 308.  
*Nitocris inflatus*, Lea, Adams' Genera i. p. 308.  
*Melania inflata*, Lea, Troschel, Archiv fur Naturgesch. ii. p. 226.
11. *A. melanoides*, Conrad.  
*Nitocris melanoides*, Conrad, Adams' Genera i. p. 308.  
*Anculotus melanoides*, Conrad, Müller, Synopsis, p. 42, 1836.  
*Leptoxis turgida*, Hald., Adams' Genera i. p. 307.  
*Leptoxis viridis*, Lea, Adams' Genera i. p. 308.
13. *A. subglobosa*, Say.  
*Leptoxis subglobosa*, Say, Adams' Genera i. p. 307.  
*Leptoxis gibbosa*, Lea, Adams' Genera i. p. 307.  
*Leptoxis globula*, Lea, Adams' Genera i. p. 307.  
*Leptoxis tintinnabulum*, Lea, Adams' Genera i. p. 307.  
*Leptoxis virgata*, Lea, Adams' Genera i. p. 307.
14. *A. praecrossa*, Say.  
*Anculosa praecrossa*, Say, Synonymy, Part 3.  
*Leptoxis praecrossa*, Say, Adams' Genera i. p. 307. Morch, Yoldi, Cat., p. 56.  
*Lithonia meretiformis*, Desh., Adams' Genera i. p. 308.  
*Anculotus angulatus*, Conrad, Müller, Synopsis, p. 40, 1836.  
*Leptoxis angulata*, Conrad, Adams' Genera i. p. 307.
15. *A. crassa*, Haldeman.  
—*Eurycalon*.  
*A. pisum*, Hald., Synonymy, Part 3, No. 19.  
*Leptoxis pisum*, Hald., Adams' Genera i. p. 307.
16. *A. taeniata*, Conrad.  
*Anculotus taeniatus*, Conrad, Müller, Synopsis, p. 41, 1836.  
*Leptoxis taeniata*, Conrad, Adams' Genera i. p. 307.

\*Has 27 years priority over *dissimilis*.

17. *A. Troostiana*, Lea.  
*Leptoxis Troostiana*, Lea, Adams' Genera i. p. 307.
25. *A. picta*, Conrad.  
*Anculosa picta*, Conrad, Müller, Synopsis, p. 39, 1836.  
*Leptoxis picta*, Conrad, Adams' Genera i. p. 307.  
*Leptoxis flammata*, Conrad, Adams' Genera i. p. 307.
28. *A. squalida*, Lea.  
*Leptoxis squalida*, Lea, Adams' Genera i. p. 307.
29. *A. patula*, Anthony.  
 =*dilatata*, Conrad.?
30. *A. viridula*, Anthony.  
 =*dilatata*, Conrad.?
33. *A. turbinata*, Lea.  
 =*Eurycælon*.

Pursuant to the By-Laws, an election of members of the Standing Committees for 1865 was held, as follows:

**ETHNOLOGY.**

J. A. MEIGS,  
 S. S. HALDEMAN,  
 I. I. HAYES.

**COMP. ANAT. AND GEN. ZOOLOGY.**

JOSEPH LEIDY,  
 J. M. CORSE,  
 J. H. SLACK.

**MAMMALOLOGY.**

J. H. SLACK,  
 J. L. LE CONTE,  
 W. S. W. RUSCHENBERGER.

**ORNITHOLOGY.**

JOHN CASSIN,  
 J. H. SLACK,  
 B. A. HOOPES.

**HERPETOLOGY & ICHTHYOLOGY.**

E. D. COPE,  
 R. BRIDGES,  
 TH. NORRIS.

**CONCHOLOGY.**

T. A. CONRAD,  
 W. G. BINNEY,  
 G. W. TRYON, JR.

**ENTOMOLOGY AND CRUSTACEA.**

R. BRIDGES,  
 E. T. CRESSON,  
 J. F. KNIGHT.

**BOTANY.**

E. DURAND,  
 JOSEPH CARSON,  
 AUBREY H. SMITH.

**GEOLOGY.**

ISAAC LEA,  
 CHARLES E. SMITH,  
 J. P. LESLEY.

**MINERALOLOGY.**

WM. S. VAUX,  
 J. C. TRAUTWINE,  
 T. D. RAND.

**PALÆONTOLOGY.**

JOSEPH LEIDY,  
 T. A. CONRAD,  
 J. L. LE CONTE.

**PHYSICS.**

B. HOWARD RAND,  
 WM. M. UHLER,  
 R. E. ROGERS.

**LIBRARY.**

JOSEPH JEANES,  
 JOSEPH LEIDY,  
 JOHN CASSIN.

**PROCEEDINGS.**

JOSEPH LEIDY,  
 WM. S. VAUX,  
 JOHN CASSIN,  
 THOMAS STEWARDSON,  
 ROBERT BRIDGES.



February 14th.

The President, DR. BRIDGES, in the Chair.

Seven members present.

The following paper was presented for publication and referred to a Committee :

"Descriptions of new species of Birds of the Families Paridae, Vireonidae," &c. By Geo. N. Lawrence.

The Committee on Proceedings placed on the table the published number for November and December, 1864.

February 21st.

Vice-President, CASSIN, in the Chair.

Sixteen members present.

February 28th.

The President, DR. BRIDGES, in the Chair.

Twelve members present.

On report of the Committee, the following paper was ordered to be published :

Descriptions of new species of BIRDS of the Families PARIDÆ, VIREONIDÆ, TYRANNIDÆ and TROCHILIDÆ, with a note on *Myiarchus Panamensis*.

BY GEO. N. LAWRENCE.

1. *POLOPTILA PLUMBEICAPS*.

*Male.* Entire crown and occiput dark plumbeous, bordered on each side by a black line which begins at the bill, running to and over the eye, and as far beyond as the dark cap extends; upper plumage dark, bluish grey; outer tail feather white, the next white except one third of the inner web at the base, where it is black, the third feather black with the end white for  $\frac{5}{18}$  of an inch, the other tail feathers are glossy black; primaries blackish brown, secondaries black, broadly margined with white; under wing coverts white; sides of the head, lower eyelid, chin and abdomen white; throat, breast and sides bluish grey, lightest on the throat; bill black; tarsi and toes plumbeous black.

First primary half the length of the second, the fourth longest, tail much graduated. Length  $4\frac{1}{2}$  in.; wing  $1\frac{1}{8}$ ; tail  $1\frac{1}{8}$ ; bill  $\frac{7}{18}$ ; tarsi  $\frac{3}{4}$ .

*Habitat.*—Venezuela. Collected by Mr. S. C. Nash.

Prof. Baird in "Review of American Birds," p. 67, (now in course of publication) has given a synopsis of the genus *Polioptila*, which he has divided into three sections, as follows :

1. Whole top of head black.
2. Sides of head black; top gray.
3. Top of head gray; sides whitish.

The species now described cannot be placed in either of these, but will form the foundation of a fourth section, having the entire crown dark plumbeous.

The color of the back and wing coverts comes nearest to that of *P. leucogaster*, but is of a lighter shade; below it is rather more plumbeous, and the tail feathers are much narrower than in that species.

2. *HYLOPHILUS ACUTICAUDUS*.

Head above and hind neck olive brown; back greenish olive, brownish on the upper part, and gradually becoming brighter green on the rump; tail dull 1865.]

greenish olive, the shafts brown, the outer two feathers narrowly margined on their inner webs with pale yellow; quills dark umber brown, edged with olive green; sides of the head, throat and upper part of the breast dull fulvous ash; breast and abdomen pale fulvous; sides olive green; under lining of wings, inner edges of quills and under tail coverts pale yellow; upper mandible light hazel brown, the under whitish; tarsi and toes pale yellowish brown.

The first primary is  $\frac{3}{4}$  of an inch long, or about half the length of the fourth, which is the longest; the tail feathers are relatively long, quite narrow and pointed at their ends; bill rather short. Length  $4\frac{1}{2}$  in.; wing 2; tail  $1\frac{1}{2}$ ; bill  $\frac{3}{8}$ ; tarsi  $\frac{1}{6}$ .

*Habitat*.—Venezuela. Collected by S. C. Nash.

In its narrow pointed tail feathers it appears to differ from all others that I have seen.

### 3. MYIARCHUS VENEZUELENSIS.

Plumage above of a dark olivaceous brown, darker on the crown; tail dark umber brown, the outer feather with the outer web dull white, tinged with brownish next the shaft; the other tail feathers have a narrow edging of bright rufous on their outer webs, the extreme ends of all dull white; quill feathers dark umber brown, the primaries with a very narrow margining of pale rufous, the secondaries and tertiaries edged with white; the wing coverts dark brown with margins of soiled white; under wing coverts pale yellow, inner edges of quills pale buffy white; throat, upper part and sides of breast bluish grey, sides under the wings slightly olivaceous; abdomen and under tail coverts very pale yellow, a little brighter only in the middle of the former; bill and feet black. Fourth quill slightly the longest, first and ninth equal. Length  $7\frac{3}{8}$  in.; wing  $3\frac{1}{2}$ ; tail  $3\frac{1}{2}$ ; bill  $1\frac{1}{8}$ ; tarsi  $\frac{3}{8}$ .

*Habitat*.—Venezuela. Collected by S. C. Nash.

This species is closely related to my *M. Panamensis*; it is a little smaller, darker and more brown above, and the yellow of the under parts paler; it differs also in the bright rufous margins on the tail feathers, in the whiter edges of the wing coverts and smaller quill feathers, and in having the feet black; it is likewise more grey on the breast.

*NOTE*. The typical specimen of *M. Panamensis* was not in very good condition, the feathers of the wings and tail being somewhat worn; since describing it I have received specimens in perfect plumage, which enable me to note some differences as follows: the color of the back is olive green; the throat is of a lighter grey than in the type, and the sides of the breast are olive green; the edges of the tail feathers are dull olive with a slight sandy tinge at the base, in the type from their worn and rusty appearance I described them as edged with pale rufous, this edging, however, is slight and not at all of marked character; the outer web of the lateral feather is pale ashy brown; the bill is dark brown, lighter underneath; the tarsi, though at first sight appearing black, have a tinge of dark reddish or vinous color; this I find to be their color also in the type. These differences are probably owing to the season when killed.

The irides are stated by Mr. Galbraith to be brown. The sexes are alike in plumage.

### 4. CHALYBURA JNEICAUDA.

*Male*. Plumage above and below shining dark green, the head, throat and neck of a golden tinge, deepening to reddish orange on the front, chin and throat; upper tail coverts reddish or coppery bronze; two middle tail feathers coppery bronze (not so bright as the tail coverts), the other tail feathers deep steel blue, all except the outer one margined with the same bronze color as the central ones, decreasing in extent from the central feathers; wings brownish purple; under tail coverts white; bill black; feet blackish brown, the toes underneath pale yellow.

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Length 5 in. ; wing  $2\frac{1}{8}$  ; tail  $1\frac{1}{8}$  ; bill 1.

*Habitat*.—Venezuela. Collected by S. C. Nash.

This species is of the same size as *C. Buffoni*, which it also most resembles, it differs from it in the golden hue of the front and throat, and in the decidedly bronzed tail, the bronzing on the tail of *Buffoni* being very slight, and is just perceptible on the edges of some of the feathers.

*C. urochrysea*, Gould, has the "tail rich golden bronze both above and beneath," and the "lower mandible fleshy red," whereas in my species the upper surface of the tail only is bronzed, and the bill is wholly black.

##### 5. CHALYBURA CARNIOL

*Male*. Upper plumage dark green with a tinge of golden on the wing coverts and lower part of the back ; upper tail coverts dark violet purple, the tail has both the upper and under surface bronzed violet purple, lighter in color than the coverts ; wings brownish purple ; throat of a shining deep green ; breast and abdomen dull green ; under tail coverts dull violet purple ; upper mandible black, under yellow with the tip black ; tarsi and toes yellow.

Length 5 in. ; wing  $2\frac{1}{4}$  ; tail  $1\frac{1}{4}$  ; bill  $\frac{1}{4}$ .

The female differs in having the middle of the throat, the lower part of the abdomen and the under tail coverts dull ash ; the outer three tail feathers marked at their ends with pale ash, most so on the outer feather.

*Habitat*.—Costa Rica, Angostura. In museum of the Smithsonian Institution.

This species appears to be somewhat like *C. Isauræ* in the coloring of the tail, but differs remarkably from that species as well as from all others of the genus, in having its under tail coverts of a dark color, instead of pure white.

I have named it in compliment to Mr. Julian Carniol whose large collections sent to the Smithsonian Institution (containing many new species besides this) give evidence of his energy and industry as an explorer.

##### 6. PANYCHLORA PARVIROSTRIS.

*Female*. Upper plumage of a rather light grass green with a golden tinge ; upper tail coverts and central feathers golden bronze, much deeper in color on the coverts ; the other tail feathers are white at their bases for more than half their length, succeeded by a broad band of brownish black and ending in white, the outer feather being most largely tipped with white ; under surface pale ashy grey ; under tail coverts white ; bill black ; toes blackish brown, underneath pale yellow.

Length 3 in. ; wing  $1\frac{3}{4}$  ; tail  $\frac{3}{4}$  ; bill  $\frac{1}{2}$ .

*Habitat*.—Costa Rica, Angostura. Collected by J. Carniol. Museum of Smithsonian Institution.

The bill is strikingly small compared with that of *P. Aliciæ*, although in their other measurements they are much alike ; it also differs from the female of that species in the upper tail coverts being golden orange instead of pure green, and in the bases of the tail feathers being white instead of green. The male will, without doubt, be found to possess the glittering green plumage of its allies.

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March 7th.

Vice-President CASSIN in the Chair.

Eighteen members present.

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March 14th.

The President, DR. BRIDGES, in the Chair.

Twenty members present.

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*Special Meeting, March 16th.*

The President, DR. BRIDGES, in the Chair.

Twenty-one members present.

The President announced the death of Dr. Thomas B. Wilson, aged 59 years, at Newark, Del., on the 15th inst., at 7½ o'clock, A. M., of typhus fever. A Committee having been appointed to draught a series of resolutions in reference to the sad event, the following were presented and adopted :

*Whereas*, The Academy of Natural Sciences of Philadelphia having sustained a most serious loss in the death of its late distinguished President, Thomas B. Wilson, M. D.,

*Resolved*, That our late fellow member, Dr. Thomas B. Wilson, is eminently entitled to be regarded as the most judicious and liberal patron of the zoological sciences that our country has yet produced, and that we have heard his death announced with sentiments of the most profound sorrow.

*Resolved*, That in his great abilities and vast scientific acquirements, as well as in all the relations of private life, we recognize in Dr. Wilson the character of a true man of genius, a thorough, earnest and most conscientious cultivator and friend of the sciences, and a most valuable and patriotic citizen.

*Resolved*, That in the infancy of the study of the natural sciences in the United States, the gratuitous and ready aid afforded by Dr. Wilson contributed largely to that development of those sciences which now places this Academy in rank with similar institutions of the old world.

*Resolved*, That the liberality of Dr. Wilson to this Academy, and the large facilities thereby provided for study and research, do fully entitle him to the unqualified gratitude, not only of our members, but of all students of the natural sciences in this country, and that we are justified in regarding, and we sincerely recommend our successors as members of this Academy to regard, his munificent and unparalleled contributions to our library, and especially to our museum, (nearly the whole of which, in several departments, we owe to his liberality), as an honorable and perpetual monument to his zeal in behalf of the natural sciences.

*Resolved*, That a copy of these resolutions be presented to each of the brothers and sisters of Dr. Wilson, and that they be published in the public journals of this city and in the scientific journals of the United States.

On resolution of the Academy, the President appointed Mr. Cassin to prepare a memoir of Dr. Wilson, to be published in the Proceedings :

On motion, it was resolved to adjourn to meet in the Hall of the Academy on Saturday, 18th inst., at 2½ o'clock, P. M., to attend the funeral of Dr. Wilson.

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*March 18th.*

The President, DR. BRIDGES in the Chair.

Twenty-eight members present.

This meeting having been held for the purpose of attending the funeral of our late lamented and distinguished member, Dr. Thomas B. Wilson, it was immediately adjourned for that purpose.

*March 21st.*

The President, DR. BRIDGES, in the Chair.

Eighteen members present.

A paper was presented for publication entitled "Notice of some new types of Organic Remains from the Coal Measures of Illinois." By F. B. Meek and A. H. Worthen.

*March 28th.*

The President, DR. BRIDGES, in the Chair.

Fifteen members present.

On the report of the Committee, the following paper was ordered to be published :

**Notice of some New Types of Organic Remains, from the Coal Measures of Illinois.**

BY F. B. MEEK AND A. H. WORTHEN.

The fossils described in this paper were discovered at a locality on the south side of the Illinois River, at Morris, Grundy County, Illinois, near the northern boundary of the Coal Measures of that State. This locality is already well known from the numerous beautiful specimens of fossil ferns it has afforded, as well as from the discovery there of a remarkable extinct Neuropterous Insect, described by Prof. Dana in vol. xxxvi. 2d ser. p. 34, Am. Journ. Sci. The bed from which all these interesting fossils were obtained, holds a position near the base of the Illinois Coal Measures, somewhat above the horizon of the second seam of coal. At the out-crop, where these specimens were collected, a thickness of about twenty feet of strata is exposed, consisting of sandy shale, passing downwards into a more argillaceous shale, forming the bed of a small stream; while a short distance further down this little stream, and at a lower horizon, a thin seam of coal crops out. No workable beds of coal are known in the State north of this County, and the Coal Measures here rest directly upon Silurian Rocks.

The fossils at this locality are immediately enveloped in biscuit-shaped iron-stone nodules. These nodules are not generally composed of concentric layers, but show, on weathered surfaces, a tendency to a laminated structure, the planes of lamination being flat, parallel to the greater diameter of the concretions, and probably also coincident with those of the shale, as they lie in the bed. On breaking open these concretions, the laminated structure is generally found not to extend within; the interior having a homogeneous, rather compact structure, and a grey or brownish grey color, (the iron being usu-  
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ally in the condition of a carbonate), while more or less arenaceous and argillaceous matters also enter into their composition. Some of the concretions seem to contain no organic remains, but often in breaking open others, a fossil is found to have formed the nucleus around which the concretionary action took place.

It is an interesting fact that we find here, near the base of the Illinois Coal Measures, a species of the remarkable genus *Bellinurus*, an intermediate link, (hitherto only known to occur in the lower Coal Measures of England and Ireland,) between the older Trilobites, and the existing genus *Limulus*. In England it is found enveloped in similar iron-stone nodules, at Cole-Brook-Dale, where three species have been discovered, one of which (*B. bellulus*, Koenig, = *B. rotundatus*, Prestwich) is closely related to our Illinois species.

We likewise find at the Morris locality a species of the genus *Anthrapalemon*, Salter, (or a closely allied type) which in Scotland also occurs in the lower Coal Measures, while neither of these genera are known in the subcarboniferous, or any lower formation. These facts furnish additional evidences, if any were necessary, (coinciding with all the other palæontological, as well as stratigraphical, evidence) of the fallacy of an opinion recently expressed by a writer in the Bulletin of the Geological Society of France, that our western Coal Measures, and particularly those of Illinois and the adjoining States, belong not to the horizon of the true Coal Measures of Europe, but to the subcarboniferous or mountain limestone series.

In a paper by one of the writers, published in the March number of the American Journal of Science, 1865, after speaking of the general distribution of marine remains in our western Coal Measures, he remarked (which was strictly in accordance with his observations up to that time) that after more than twenty years familiarity with the fossils of the coal formation of the Western States, he had never seen amongst them any terrestrial or fresh-water types, other than plants. Since investigating the fossils described in this paper, however, amongst which it will be seen there is believed to be a Caterpillar, we can but regard the Morris bed as an exception to this general rule. If the fossil to which we allude is a true Caterpillar, its presence there, along with the insect described by Prof. Dana, would indicate that this bed was probably deposited in an estuary, into which this little worm-like larva, and the other insect, were doubtless carried from the land by an inflowing stream or the ebbing tide. This suggestion also receives some support from the affinities of the associated crustacea, since the genus *Bellinurus*, from its relations to the existing genus *Limulus*, might have been capable of living at least in brackish waters, although the English species are associated with marine forms. The genus *Anthrapalemon* is also supposed, by Prof. Dana, to have been related to *Eglea*, a fresh-water type. In addition to these facts, no unquestionable, strictly marine forms of any kind have, so far as we know, been yet found in this bed.

The existence of this exceptional case (if it is such) of terrestrial and fresh or brackish-water fossils in our western Coal Measures, has no bearing, however, against the general conclusions in connection with which the statement above alluded to was made; nor even, indeed, against the general accuracy of the statement itself, since the fact of the almost exclusive and general distribution of marine animal remains in our western Coal Measures, stands unshaken.

The fossils here noticed will be fully illustrated and described, and such additional facts given as we may in the mean time learn from other specimens, in the forthcoming report of the Illinois Geological Survey, for the publication of which we are happy to announce the Legislature has made a liberal appropriation.

We are indebted to Prof. Dana for the use of several specimens of some of the crustacea described in this paper, as well as for suggestions in regard to their affinities; also to Dr. Stimpson for suggestions respecting the same.

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We are likewise under obligations to Mr. Joseph Evans, of Morris, Illinois, who first discovered the fossils at this locality, for the use of several specimens. Amongst others, the form we have supposed to be a Caterpillar and that we have referred to *Anthrapalæmon*, belonging to him.

## CRUSTACEA.

## ENTOMOSTRACA.

## XYPHOSURA.

## Genus BELLINURUS, Kœnig.

Not having had an opportunity to consult Kœnig's original diagnosis of this genus, nor indeed a good description of it by any other author, we are not aware what characters were assigned it, or how its author proposed to distinguish it from the existing genus *Limulus*. Most authors, including Milne Edwards, Bronn, Prestwich, Mantell, Portlock, Murchison and others, referred the species to *Limulus*, though Portlock in doing so remarks that the distinct trilobation and segmentation of the abdomen in these fossil species, seem to constitute a generic distinction. Pictet admits the genus in his *Trait de Palæont.*, ii. 538, and remarks that it is distinguished from *Limulus* "by the articulation of the tail, and above all by the abdominal buckler presenting two distinct longitudinal furrows." Prof. Owen also admits the genus, in his valuable "Palæontology, or Systematic Summary of Extinct Animals," (p. 43) and says it differs from the "King-Crab, (*Limulus*) in the movable condition of the body segments."

A careful study, however, of fine specimens of the species described below, has satisfied us that the segments of its abdomen are not movable, but as firmly and completely united into a single shield as in the genus *Limulus*. We are, therefore, led to believe that this genus is mainly distinguished from *Limulus*, (so far as its characters have yet been made out) by the more transverse form of its cephalo-thoracic shield, its proportionally much longer and more slender legs\*, the transversely or subcircular form, and distinct trilobation and segmentation (not complete division, however,) of its abdomen; as well as by its flattened borders without movable spines. There are also some differences in the more anterior position of the eyes, the stronger and more continuous character of the ocular ridges, as well as in the subdivisions of the area circumscribed by these ridges in *Bellinurus*. Other differences, of perhaps greater importance, will probably be observed, when the appendages of the under side can be seen.

None of our specimens are in a condition to show the small anterior pair of simple eyes, though from the general analogy of this interesting crustacean to the genus *Limulus*, it is more than probable better specimens may show them. And yet it is possible, from the more anterior position of the eyes, corresponding to the larger reticulated pair in the genus *Limulus*, that the small supplementary pair may not have been needed. As in *Limulus*, it shows a row of six small pits in each of the longitudinal furrows of the abdomen, marking the position of the muscular apophyses within; while the condyle, for the articulation of the abdomen with the cephalothorax, seems to agree exactly with that of *Limulus*.

We are not aware of the nature of the peculiarities in the articulation of the caudal segment mentioned by Pictet, none of our specimens being in a condition to show the connection of these parts satisfactorily, while he does not explain in what the difference consists.

\*One of our specimens of the following described species, as well as one of *B. anthrax*, figured by Prestwich, (Trans. Geol. Soc., London, v. p. xli. fig. 1.) shows that at least one pair of the legs (if they were articulated around the mouth, at the middle of the cephalothorax, as in *Limulus*) must have been quite as long as the abdominal and cephalothoracic shield together; which would be proportionally more than twice the length of any of the legs in *Limulus*.

## BELLINURUS DANÆ, M. &amp; W.

Cephalo-thoracic shield transversely crescentric, more than twice as wide as long, moderately convex, the height nearly equalling half its length; anterior and antero-lateral margins broadly and regularly rounded; lateral angles produced obliquely backwards and outwards, with a very slight inward curve, into slender mucronate spines, terminating remote from, and nearly opposite the middle of the abdomen; posterior margin on each side for about two-thirds of the way in from the lateral angles, toward the middle, concave in outline; nearly straight or very slightly concave along the middle between these two points. Mesial lobe small, somewhat lower than the ocular ridge on either side, but rounded and well defined behind, where it supports a small central tubercle (or short spine?), thence narrowing forward, and sometimes showing a slight tendency to develop a second much smaller tubercle, at about one-third the length of the shield from its posterior margin; near which point it suddenly contracts into a mere linear carina that extends forward to the anterior transverse division of the ocular ridge. Area circumscribed by the ocular ridge, crown-shaped, or subquadrangular in outline, and composing the central third of the cephalo-thoracic shield; a little wider anteriorly than its length, which equals about five-sixths that of the shield; lateral margins concave in outline; anterior side convex, with a central emargination; internal surface divided into four irregular subordinate areas, by the mesial lobe with its linear anterior continuation, and a less distinctly defined, secondary transverse linear ridge. Ocular ridge narrow, but distinct, its lateral divisions arching inwards behind the eyes, and terminating posteriorly at the margin of the shield nearly opposite the middle of each lateral lobe of the abdomen, in a (triangular?) spine, which is directed backwards, outwards and a little upwards; anterior transverse division arching forwards on each side, and curving backwards in the middle. Compound? eyes small, remote, and located one at each antero-lateral angle of the crown-shaped central area, at points about one-third the length of the shield from its anterior margin. (Simple eyes, if they existed, unknown.)

Abdomen transversely suboval, or truncato-subcircular in outline, being wider than long, and nearly straight anteriorly, with lateral margins rounding in abruptly in front, and more gradually into the regularly rounded posterior outline; generally rather more depressed than the cephalo-thorax, particularly in front. Flattened lateral border rather narrow, and regularly scalloped between its projecting marginal spines. Mesial lobe narrow, or of about the same breadth as that of the cephalo-thorax, and near half as broad as, and a little more elevated than, the lateral lobes; segments well defined; first and third each provided with a small central tubercle; sixth as long as any three of the others, rather abruptly narrowed and depressed behind, and surmounted anteriorly by a large tubercle (or spine?). Lateral lobes somewhat flattened on the inner half, and rounding down rather abruptly to the flattened free borders on each side and behind; segments defined by distinct linear ridges, which are separated by flattened spaces four or five times as wide; these ridges extend obliquely outwards and a little backwards across the lateral lobes and their flattened borders, beyond which they are produced into slender mucronate spines, of nearly equal length, curved obliquely backwards.

Caudal segment, or stylet, apparently nearly two-thirds as long as the abdomen; gradually tapering, and trigonal or sub-trigonal, being flat below, angular on each side, and angular or rounded above.

Appendages of the under side unknown, excepting one of the legs, which is seen in one specimen, projecting out from under the cephalo-thoracic shield, between its posterior margin and the abdomen. It is long and slender, and shows of the first segment projecting from under the shield, a length of about 0.12 inch. The next segment appears to be 0.25 inch in length, with a breadth of only 0.04 inch. The succeeding segment can be traced in

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the matrix for a distance of about 0.30 inch, being slightly curved near the extremity, and apparently tapering to a point, this was probably also provided with a movable finger as in *Limulus*, but the specimen is not in a condition to show it. It is not possible to determine which one of the legs this is.

Entire length from the extremity of the caudal segment to the anterior margin of the cephalo-thorax, about 1.90 inches. Length of cephalo-thorax, 0.57 inch, breadth of do. to the extremities of postero-lateral spines, 1.70 inches; length of area included within the ocular ridge, 0.50 inch; greatest breadth of do. (which is the distance between the eyes,) 0.60 inch. Length of abdomen, 0.65 inch; breadth of do., exclusive of the flattened margin, 0.94 inch, including it, 1.06 inch; breadth of mesial lobe, 0.23 inch; length of caudal segment, about 0.60 inch.

Of the known species of *Bellinurus*, ours seems to be most nearly related to *B. bellulus*, Koenig, (the type of the genus, if we mistake not), which is regarded as being identical with *Limulus rotundatus*, of Prestwich, (Trans. Geol. Soc., London, v. p. 413, pl. XLI. figs. 4, 6 and 7.) From this species, however, it may be at once distinguished by having the lateral angles of its cephalo-thorax produced into long, slender spines, and the flattened border of its abdomen proportionally much narrower, and armed with a series of sharp-curved spines, instead of being merely serrated.

We should also remark here, that Prof. Owen's figure of *B. bellulus*, (Palaeontology, p. 42,) as well as that given by Murchison of the same, under Prestwich's name *rotundatus*, (Siluria, p. 318,) represent the eyes as being located at the lateral extremities of a large, transversely oval or subelliptical area; while within this, there is a smaller, crown-shaped area, circumscribed by a ridge, and in all its principal features, corresponding to that which in our species has the eyes located at its anterior lateral angles. This wide difference in the position of the eyes, as well as in the ridges of the central region of the cephalo-thoracic shield, if they really exist, would apparently be of more than specific importance. The close general agreement, however, of these forms, in all their other essential characters, renders it very improbable that they belong to different genera. Hence, we would suggest that there may have been some error in the figures cited above, representing the eyes (which are with difficulty seen in any but well preserved specimens) in this outer position, and the presence of a large outer ocular area surrounding that corresponding to the quadrangular one in our species. We are the more inclined to think this is the case, from the fact that Owen's and Murchison's figures appear to have been reduced from Prestwich's figures 5 and 6, cited above; which represent the two halves of a nodule, containing a specimen and its mould, of *B. bellulus*, with a large transversely oval space in the central region of the cephalo-thorax, as we must think, *accidentally crushed in*. This view seems to be sustained, too, by Mantell's figures of the same species, from specimens collected by him at the same locality, (see Medals of Creation, p. 550,) which show no traces of this outer transversely oval ocular area.

In the elongated, spine-like character of the lateral angle of its cephalo-thoracic shield, as well as in having the margins of the abdomen armed with sharp spines, our species agrees more nearly with *B. anthrax* (= *Limulus anthrax*, Prestwich), but it differs in the form of the outline of the anterior side of the cephalo-thorax, as well as in the direction of its prolonged lateral angles, and its less produced spines around the flattened margins of the abdomen. Hence, it appears to be intermediate in its characters between *B. anthrax* and *B. bellulus*.

We are gratified to be able to dedicate this fine species, the first of the genus hitherto discovered in America, to Prof. James D. Dana, the author of one of the most important works on the Crustacea ever published; to whom we are indebted for the loan of one of the specimens from which the foregoing description was drawn up.

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## TETRADECAPODA.

## ISOPODA.

## (ANISOPODA.)

## ? Family ACANTHOTELSONIDÆ.

## Genus ACANTHOTELSON, Meek &amp; Worthen.

Superior antennæ nearly as long as the inferior, and provided with well developed accessory appendages; flagella of both pairs longer than the peduncles; head about equalling the length of the first two anterior thoracic segments. Thoracic and abdominal segments (except the last one) not differing materially in length, and each shorter than the head. Anterior thoracic legs longer than the others, not chelate. Telson or terminal segment simple, long, spiniform, and laterally compressed. Stylets with second segments (bifid?) much longer than the first, and similar to the telson.

The fact that the oral apparatus, and other appendages of the head, as well as the branchiæ, always so important in the classification of the Crustacea, are so rarely preserved in fossil species, especially those of smaller sizes, renders their study more difficult than that of most other organic remains. Hence, in describing new species, genera, or other groups, the palæontologist is often unable to give any information in regard to the very parts that would be the first to claim the attention of the Carcinologist in the investigation of recent species. Another difficulty also arises from the fact that, as in other departments of palæontology, it often happens in the study of fossil crustacea, we meet with types presenting a combination of characters which in existing species are distributed in widely distinct groups. So that on finding a new type showing only a part of its characters, we would often be led at once to place it in a group with which probably the next specimen found would show it to possess some one or more wholly incompatible peculiarities.

On first examining specimens of the typical species of the genus above described, our impression was, that it must be, beyond all doubt, a true *Amphipod*. A more careful examination, however, soon showed that it presented the radical difference from all the known types of that extensive group, of having only one pair of the abdominal appendages styliform, and the other five natatory, instead of three pairs styliform and three natatory; thus combining with its Amphipodan abdomen, thorax, head, anterior appendages, and general physiognomy, the single pair of styliform appendages of the *Isopoda*.

Being therefore left in doubt in regard to its affinities, we sent sketches of some of the best specimens to Prof. Dana, who had also previously received some imperfect specimens of the same species from Illinois. On examining these sketches and specimens, Prof. Dana wrote that he thinks this crustacean most probably belongs to a group holding an intermediate position between the typical *Isopoda* and the *Amphipoda*, for which he has proposed the name *Anisopoda*. This intermediate group, as first shown by Prof. Dana, is characterised, like the *Amphipoda*, by having the three posterior pairs of thoracic legs in one series, and the four anterior in another; while, as in the *Isopoda*, the branchiæ are abdominal, and only one pair of abdominal appendages are styliform, and five branchial.

In regard to the division of the thoracic legs into two series, we would remark, that we have observed no evidences of it in all the specimens we have seen, excepting one of those kindly loaned us by Prof. Dana. In this, however, four pairs of these legs seem to be directed backwards, and only three forward; which, if not produced by accidental distortion, would indicate *Isopod* affinities. Yet, in all the other specimens seen, the whole seven pairs are directed forward. Although much inclined to believe the latter their normal arrangement, it should be remembered, as suggested by Prof.

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Dana, that however important this character may be in the study of the recent Tetracapod crustacea, it can scarcely be made available in the investigation of crushed fossil species, where so many accidents might have occurred to place the legs in an unnatural position.

We have not been able to clearly satisfy ourselves whether or not our crustacean had squamiformly developed epimerals, as in the normal groups of *Amphipoda*; though some of the specimens appear to show indications of such development; while the shortening of the vertical diameter of the thoracic segments, as compared with those of the abdomen, would seem to be, as it were, an arrangement to make room for such scale-like epimerals. In addition to this, the fact that all of the six or eight specimens we have yet seen, lie in the concretions upon one side or the other, would appear to indicate that the lateral motion of the thoracic legs was in some way restrained so as to prevent the animal from taking an erect position, which is precisely the effect produced in the normal *Amphipoda* by the possession of well developed squamose epimerals. If this should prove to be the case, it would show that the remarkable combination of *Amphipod* and *Isopod*, or *Anisopod* characters, already alluded to in this fossil, are real, and not simulative; since it would thus present mainly the anterior structure (possibly even to the thoracic position of the branchiæ) of a normal *Amphipod*, combined with the single pair of styliform, and five natatory abdominal appendages of the *Isopoda* or *Anisopoda*.

It must be evident, we think, that such an ensemble of characters as that presented by our fossil, would exclude it from any known family of the *Tetracapoda*; hence we can but regard it as the type of a new family.

#### ACANTHOTELSON STIMPSONII, M. & W.

Linear or sublinear in form. Upper antennæ at least as long as the head and first five thoracic segments; peduncle moderately stout, rather longer than the head; first joint a little longer and wider than the two others, which are of nearly equal length; flagellum slender and very minutely jointed; accessory appendage nearly or quite as long as the flagellum, and like it, minutely jointed. Inferior antennæ as long as the head and seven thoracic segments; peduncle slightly longer, but otherwise similar to that of the upper antennæ; flagellum a little stouter and longer, but in other respects as in the upper pair. Head, as seen in the (compressed) side view, subquadrangular, longer on the upper than the lower side, in consequence of the obliquity of anterior side; eyes small, round, placed just below the bases of the upper antennæ. The (fourteen) thoracic and abdominal segments distinct, and (excepting the last one) of nearly equal length,—a few of those nearest the head being a little shorter than the others; all diminishing in depth (side view) from about the antepenultimate one forward; their anterior basal margins rounded; posterior rectangular, or a little rounded.

First pair of thoracic legs about one-fourth longer, and a little stouter than the succeeding five pairs, and apparently terminating in a slender, sharp dactylus; first joint above, a little shorter, narrower, and more tapering than the next—neither more enlarged than the other joints above. Five succeeding pairs of legs of nearly equal size and form; their upper two (or three?) joints very short, and not enlarged; seventh pair nearly as long as the first, and more slender than the others. Natatory abdominal appendages long and slender; styliform pair with first joint short and quadrangular; second and only other joint (double?) with each branch (if there are two) simple, equal and as long as the telson, which they nearly exactly resemble in form; their upper and lower margins each with a row of short, oblique, rather distant setæ, between which may be seen by the aid of a magnifier, a series of much more minute, closely-arranged setæ. Telson as long as the last four abdominal segments; at its base one-half as wide, vertically, as the penultimate

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abdominal segment; thence tapering, at first rapidly, and then very gradually, to a mucronate point,—upper and lower margins setigerous, like those of the stylets.

It is possible that when we can have an opportunity to examine additional specimens, we may have to modify some of the characters given in the foregoing generic or specific description; though not, we believe, in any very essential particular. We hope, however, to be able, hereafter, to clear up several doubtful points in the structure of this interesting type, when we can have better specimens for study.

Length from anterior side of head to the extremity of the penultimate abdominal segment 1.30 inches; length of telson 0.31 inch; length of the first six abdominal segments 0.52 inch; length of the seven thoracic segments about 0.64 inch. Height of third abdominal segment 0.20; height of each first two or three thoracic segments 0.12 inch; length of stylets about 0.21 inch, of which the first joint forms only about 0.06 inch. Length of outer antennæ, including its peduncle, 0.66 inch.

It is with pleasure that we dedicate this typical species of a new and remarkable extinct genus to our friend Dr. William Stimpson, whose labors in carcinology, and various other departments of zoology, are well known in this country and Europe.

#### ACANTHOTELSON INÆQUALIS, M. & W.

The specimen upon which we propose to found this species, appears to agree with the last in almost every respect, excepting in the proportional size and the form of the segments. In the first place, the penultimate abdominal segment is nearly twice the length of any of the others, instead of being nearly or quite of the same length; while the other abdominal segments (as seen in a side view) are more cuneiform than in the last. Again, the fifth and sixth thoracic segments are longer, particularly above, and the fourth shorter, than any of the others, instead of all being of about the same length. We have not been able to see the stylets, nor to make out the nature of the legs, but from a part of one of those of the anterior pair, they would seem to be rather stouter than in the last-described species.

As these differences can scarcely be due to accidental distortion, we can but regard this form, with the material now at hand for comparison, as a distinct species. If we are correct in this view, it is probable good examples will show other differences than those mentioned above.

Length of head, thorax and abdomen 0.90 inch; length of head 0.12 inch; length of the seven thoracic segments about 0.50; length of first five abdominal segments 0.26 inch; length of penultimate abdominal segment 0.09. Height of third abdominal segment (flattened side view) 0.13 inch; height of anterior thoracic segments about 0.07 inch. Length of lower antennæ at least 0.45 inch; length of upper not less than 0.36 inch, and probably a little more.

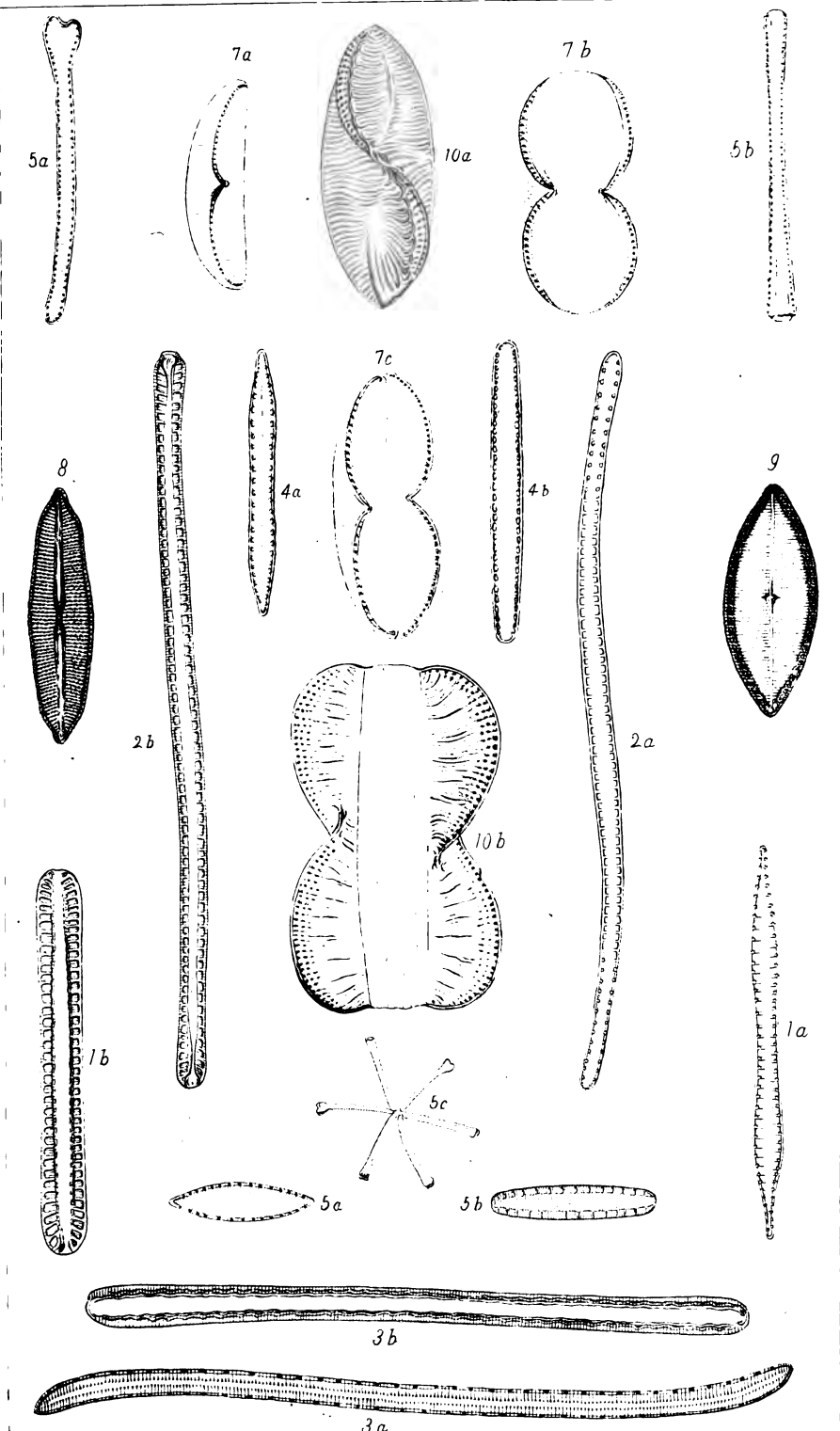
#### ?Family PALÆOCARIDÆ.

#### Genus PALÆOCARIS, Meek & Worthen.

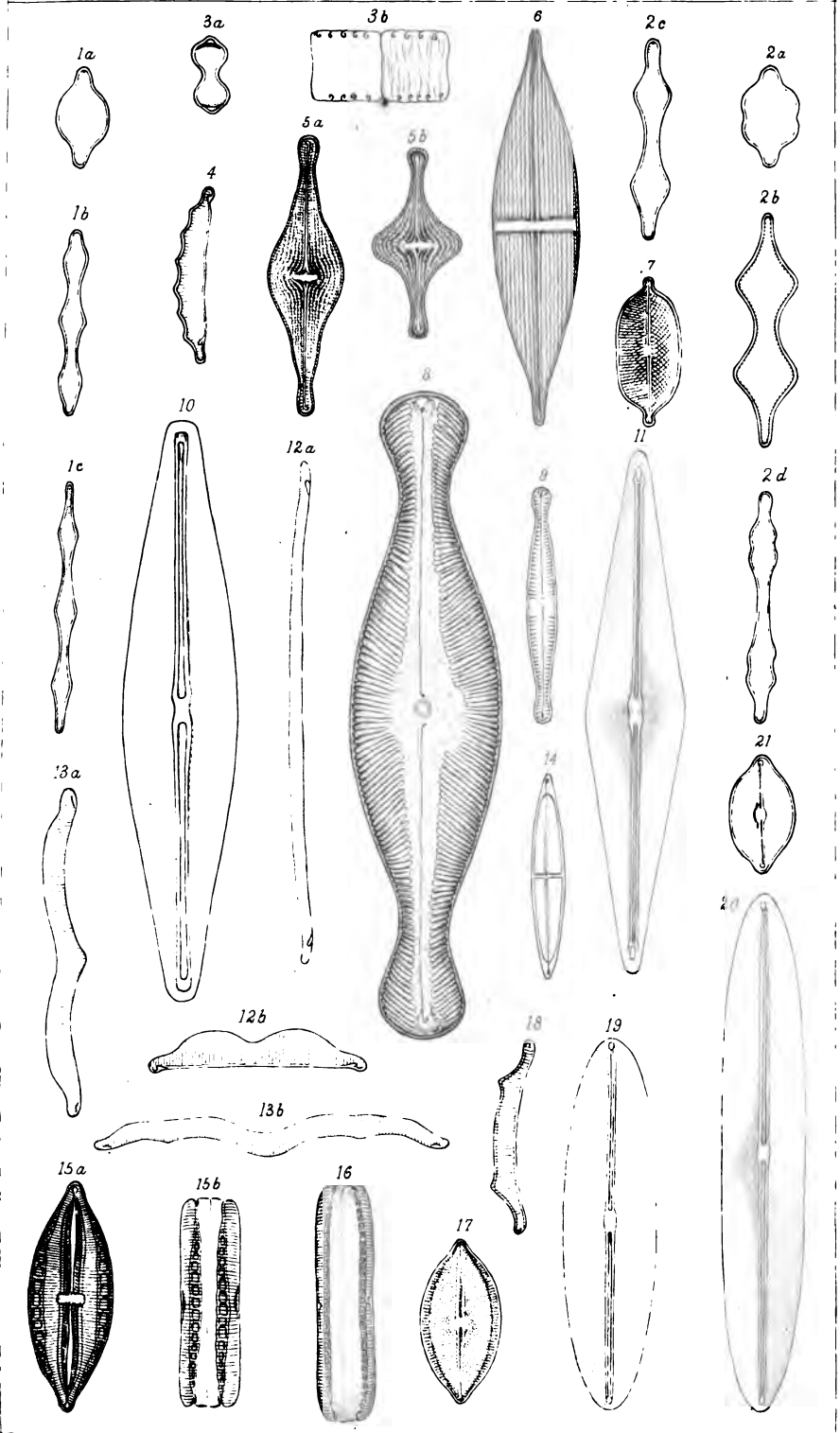
Inner and outer pairs of antennæ of nearly equal length, the former each bearing a well developed accessory appendage; peduncles of both pairs shorter than the flagella. Head about as long as the first two abdominal segments. Thoracic legs long and slender; anterior pair not chelate. Telson long, tapering and horizontally flattened; stylets with first joint very small, second double, and also flattened horizontally.

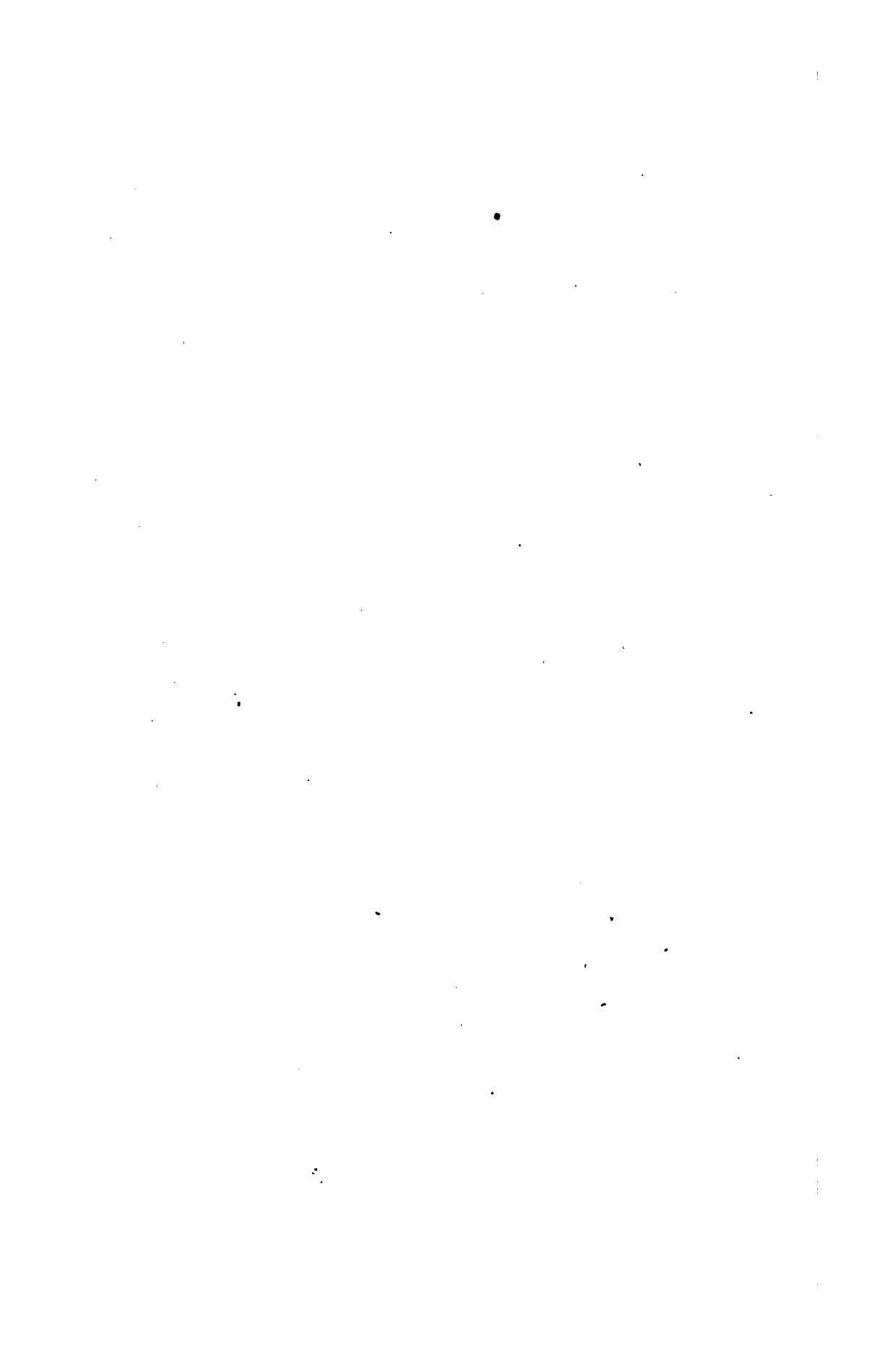
This is another remarkable type, presenting, so far as can be determined, even a more puzzling combination of characters than that we have described under the name *Acanthotelson*. In the nature of its antennæ, with their apparently well-developed basal scales, the structure of its caudal appendages, and its long, slender legs, spread out on each side, for walking in an erect

[Mar.











attitude; as well as in the depressed, slender form of its abdomen and thorax, it seems to present decidedly the aspect of a *Macrural Decapod*. Yet, on a closer examination, we can see no traces of a carapace,—the thorax being apparently divided into seven segments, like those of the abdomen, and each provided with a pair of legs, as in the *Tetradecapoda*. If we are not mistaken in these latter characters, and we certainly believe we are not, it must show a most extraordinary union of characters, which, amongst recent crustacea, belong to different primary divisions. From all that can be made out of its structure, we are therefore inclined to view it as one of the "embryonic" or "comprehensive" types, so often met with in various departments of palæontology, and which furnish the advocates of the Darwinian hypothesis with some of their strongest arguments.

For the present, this genus is placed, provisionally, along with the *Tetradecapoda*, though it cannot, we think, be included in any known family of that division; while if it should prove to be an embryonic or low type of the *Decapoda*, it may be even necessary to establish for its reception, a division of more than family importance. It is proper to remark here, however, that we have not seen any one specimen showing the caudal appendages we have described, along with the other characters of the thoracic and cephalic members, mentioned above. One imperfect specimen shows the seven thoracic and five or six of the abdominal segments, with their legs and natatory appendages, the head, antennæ, and apparently their basal scales; while another shows the caudal appendages, and all of the thoracic and abdominal segments, very distinctly, without any of the other members. The general agreement, however, of these specimens, in the parts preserved in each, is such that scarcely a doubt can be entertained that they belong to the same species. Yet, in order to prevent confusion, we would remark, that in case they should prove to belong to different genera, or species, that it is the form showing the head, antennæ, thoracic and abdominal segments, with their appendages, &c., that we regard as the type of the genus.

PALMOCARIS TYPUS, M. & W.

Linear, with thorax slightly wider near the middle than the abdomen; thoracic and abdominal segments of nearly equal length. Inner antennæ equalling the length of the head and thorax; peduncles stout, first joint a little longer and wider than either of the other two, which are of nearly equal length, and minutely and closely setigerous on their inner margins; flagellum very slender, and minutely jointed; accessory appendage nearly or quite as long as the flagellum, and scarcely differing from it otherwise. Outer antennæ possibly a little longer than the others, peduncles slightly longer than those of the other pair, and like them minutely setigerous in front; basal scales (?) oblong, about as long as first joint of peduncles, squarely truncated. Thoracic legs slender and long, anterior ones apparently not longer or larger than the others, none of them (so far as can be seen) chelate, or with any of the segments enlarged; all the others with the first two or three joints very short; fourth? joint horizontally extended, tapering, and about as long as four segments of the body; succeeding joints (in the specimen examined) very slender and abruptly bent downwards and backwards. Natatory abdominal appendages acutely lanceolate, and some of them as long as four of the abdominal segments. Telson nearly as broad at the base as the penultimate segment, tapering, and as long as two and a half of the abdominal segments; minutely setigerous on each side. Stylots, with first joint very minute; second with each division as long as the telson, and lanceolate in form, with pointed extremities, and parallel, more or less setigerous margins.

Length of head, thorax, and first six abdominal segments, 0.78 inch; do. of head, 0.12 inch; do. of the seven thoracic segments, 0.35 inch; do. of 1865.]

the first six abdominal segments, about 0.31. Length of telson, about 0.14 inch; do. of stylets, near 0.13 inch. Length of lower or outer antennæ, not less than 0.38 inch, (probably more), of which the peduncle forms 0.15 inch; do. of inner, near 0.40 inch. Breadth of thorax, 0.13 inch.

## DECAPODA.

### MACRURA.

#### ? Genus ANTHRAPALEMON, Salter, 1861.

The genus *Anthrapalemon* was proposed by Mr. Salter in the Quarterly Journal of the Geological Society of London, vol. xvii., p. 529, for the reception of a Crustacean from the Coal Measures of Scotland. His description of the genus reads as follows:—

"Carapace scarcely so broad as long, (except when crushed flat), simple, flatter than semicylindrical, the sides a little arched outwards. A strong central ridge in front, projecting as a thick (serrate?) spine is separated by a concave space, or slight furrow, from a posterior central ridge, which only occupies (in the type species, *Grossarii*) a small portion of the length. Front margin serrated. The outer antennæ have wide, square basal joints, apparently *without any advantage*;\* the 2d and 3d joints not much oblique; the rest about as broad as long. Abdomen as broad as long, of six joints (besides the telson), broad and very short; the pleuræ, except the 2d, pointed. Telson very broad; appendages to the penultimate joint, double on each side, subtrigonal, broad."

The name *Anthrapalemon* was proposed from its supposed affinities to the recent genus *Palemon*, but Prof. Dana thinks it more nearly related to *Agilis* and *Galathes*.

#### ANTHRAPALEMON GRACILIS, M. & W.

It is with considerable doubt that we venture to refer this species to Mr. Salter's genus, the only specimen we have seen being imperfect, and not in a condition to show the more important characters. In form and general appearance, however, as well as in such of its details as can be made out, it seems to agree well with that genus. The specimen consists of the abdomen and caudal appendages, (in a crushed condition), and an impression in the matrix of the under side of the carapace, the outer pair of antennæ, and apparently of the eyes. The carapace, as seen from above, presents nearly an oblong form, excepting that the lateral margins are moderately convex in outline; the two extremities are truncated, and the breadth nearly or quite equalling three-fourths the length. Its lateral margins, in front of the middle, are each finely serrated by six small, sharp, projecting points as in the type of the genus, excepting that they are sharper, and directed more obliquely forward. At each antero-lateral angle, there is also a considerably larger projecting point, forming a short spine, exactly as in the type of the genus, excepting that it is extended more nearly directly forward. The outer pair of antennæ are moderately stout; each peduncle showing three joints, diminishing rather gradually in size, the first longer than wide, and the other two apparently of nearly equal length and breadth, and obliquely articulated. The flagellum is narrower at its base than the last joint of the peduncle, and composed of very short segments, which are scarcely more than one third as long as wide. The entire length of the antennæ cannot be determined, as neither flagellum is entire in the specimen examined, but as the portion remaining tapers very gradually, they were probably rather long. They are both, in the specimen examined, deflected abruptly outwards, nearly at right angles to the longer diameter of the carapace, which would seem from the

\*Is not this a misprint of the word *appendage*?

oblique articulation of the second and third joints of the peduncles, to the their natural position. (Inner antennæ unknown.)

Immediately between the bases of the two outer antennæ, the specimen shows what appear to be impressions of the two globose eyes, which with their peduncles extend forward about two-thirds as far as the peduncles of the antennæ. These may possibly be the peduncles of the inner antennæ; but they look very much like globular eyes, on more slender peduncles.

The abdomen is more than half the length, and about two-thirds the breadth, of the widest part of the carapace. It shows five short segments, and apparently part of another, the first of which is a little smaller, and the second a little larger than the others. None of them, however, are more than one-fifth as long as the breadth of the abdomen.

The caudal appendages being unfortunately bent down and crushed, it is not possible to make out the form of the telson or the details of the other parts, though the whole together seem to have been wider than the abdomen, and as wide as the carapace. No surface sculpturing can be clearly made out, though there is some appearance of a few irregular scattering granules near the margin of the carapace. (Other parts unknown.)

Entire length, from the stalked eyes? to the extremity of the caudal appendages, about 1.13 inches; length of carapace, 0.63 inch; breadth of do. near the middle, 0.45 inch; at the extremities 0.31 inch; length of abdomen, 0.30 inch; breadth of do. near the middle, 0.26 inch. Length of peduncles of the antennæ 0.15 inch; do. of eyes? and their peduncles, 0.13 inch.

It will be observed from the foregoing description that our specimen shows no traces of the central spine or beak, extending forward from the anterior extremity of the carapace, nor of the longitudinal carina connected with it, which constitutes such a marked feature in *Astraspalemon*. It is possible, however, that this character may have been obliterated in breaking open the concretion, since our specimen only shows an impression of the under side of the carapace, while the appendage alluded to projects forward from the upper side, and may consequently be embedded in the other half of the concretion, which we have been unable to obtain. Still as it is possible that this appendage may be wanting in our fossil, we should not be surprised if it would prove to belong to an allied but distinct genus.

Specifically at least, it differs from *A. Grossarti*, of Salter, in the proportionally much shorter joints of the flagella of its outer antennæ, and the oblique articulations of the segments of their peduncles; while the latter, as well as the surface of other parts, are without any traces of the fine pitting represented by Mr. Salter's figures. Our specimen also shows traces of what appear to be squarely truncated basal scales to the outer antennæ, about as long as their first joints, while Mr. Salter's figure (1), represents apparently a triangular scale over the left antenna.

Length from the end of the caudal extremity, to the anterior margin of the carapace, 1 inch. Length of carapace, 0.60 inch; breadth of do. 0.43 inch. Length of abdomen, about 0.30 inch; breadth of do. 0.27 inch. Length of caudal appendages, 0.10 inch.

## MYRIAPODA.

? Genus ANTHRACERPES, Meek & Worthen.

ANTHRACERPES TYPUS, M. & W.

This genus and species are founded upon a slender worm-like fossil, the relations of which have not been very clearly determined. The specimen consists of a well defined mould or impression left in a concretion, and measures 1.50 inches in length, and about 0.09 inch in breadth, (height) as seen lying upon one side. It is regularly arched from end to end, so as to form about one-third of a circle of 0.65 inch radius. For most of its length, it is  
[1855.]

of very uniform breadth or height, but it tapers very gradually towards what appears to be the posterior end, where the last segment terminates in three or four short, slender, spine-like appendages, directed backwards on a line with the general curve of the body. The other end being broken away in the only specimen yet known, the nature of the head and its appendages cannot be determined.

The entire body is distinctly articulated, and shows clearly nineteen segments, and part of another. The segments are of nearly uniform size, or only vary from 0.08 to 0.10 inch in length; the last one, however, has only a breadth or height of about 0.03 inch, and the next about twice that. Crossing the segments near the upper side, may be seen in the mould an undefined furrow, (produced by a ridge in the fossil itself) which bends downwards and then up again as it passes across from side to side of each segment. Anteriorly it is less distinct and placed very near the dorsal margin, but in tracing it backwards it is found to descend and become more defined, until it reaches the fourth segment from the extremity; on this it passes obliquely downward to its posterior inferior corner, so as not to be seen on any of the succeeding divisions behind. Below the middle of each segment, there is in the mould a small prominence, evidently marking the position of a corresponding pit in the fossil. These agree in position and appearance with the spiracles or breathing apertures in the *Myriapoda*. We have not been able to make out very clearly, any indications of feet or other appendages; though there is near the base of each segment of the mould, a short oblique impression, that may possibly have been left by very small feeble legs folded backwards.

As this fossil shows too many segments for a larval insect, and has not the aspect of an *Annelid*, we are rather inclined to view it as a *Myriapod*.

## INSECTA.

### LEPIDOPTERA.

Genus PALÆOCAMPA, Meek and Worthen.

PALÆOCAMPA ANTHRAX, M. & W.

The fossil for which the above generic name is proposed, is about 0.70 inch in length, and some 0.13 inch in breadth, exclusive of the projecting tufts of hairs. It is an arcuate, worm-like body, that has been divided or split lengthwise in breaking open the concretion in which it is enveloped; so that it is only a longitudinal section we see in looking at either half of the concretion. At both extremities, and along the upper or convex side of the curve, we observe densely packed tufts or fascicles of hairs individually radiating, as if from small wart-like protuberances. These hairs are straight, and about 0.30 inch in length. At one extremity, which appears to be the anterior, two of the bundles of hairs are more radiating than the others, and directed forward. The bundles distributed over the curved or dorsal side are regularly arranged, and have each a general direction at right angles from the part of the arched side from which they spring. At the posterior extremity there are also two tufts directed backwards, the individual hairs of which are less radiating than those at the other extremity. Between some of the bundles ranged along the upper side, some shorter tufts are seen, which appear as if they originate in another series of protuberances farther over on the other side embedded in the matrix. If we suppose each of these principal bundles along the curved side, and the two bundles at either end to each belong to a single segment, it would make about ten or eleven segments to the entire body.

The specimen is not in a condition to show the head or feet; yet we are strongly inclined to believe from its form, and peculiar regularly arranged bundles of hairs, that it is a CATERPILLAR. If we are right in this suggestion,

[Mar.

its discovery is certainly an interesting one, as it would present an evidence of the existence of *Lepidopterous* Insects, at a much earlier period in our world's history than has hitherto been suspected.

As this fossil will doubtless be met with in the Coal Measures at other localities, whether or not its connection with the mature Butterfly or Moth can ever be positively established, it seems desirable, for convenience of reference, that it should receive a name; although we are unable to point out any well defined characters from the only specimen seen, by which it can be distinguished from the larva of several existing types. That there is any probability, however, of its belonging to any existing genus, will, we think, not be maintained by any person familiar with the range of generic types in time.

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*April 4th.*

Vice-President, CASSIN, in the Chair.

Twenty-two members present.

The following paper was presented and referred to a Committee:

"Diagnoses Specierum et varietatum novarum Molluscorum," etc.  
By Philip P. Carpenter.

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*April 11th.*

The President, DR. BRIDGES, in the Chair.

Twenty-five members present.

The following were presented and referred to a Committee:

"Synopsis of the genus *Pomoxys*," "On the genus *Caulolatilus*," "On the cranial characteristics of *Gadus proximus*," and "Note on several genera of Cyprinoids." By Theo. Gill.

The Curators exhibited a large living specimen of the Great Crab-Spider, *Mygale cancerides*, recently brought from Brazil, and presented by Mr. Newton.

The Secretary announced the death, on the 30th ult., of Major Charles I. Maceuen, late a member of the Academy.

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*April 18th.*

The President, DR. BRIDGES, in the Chair.

Twenty members present.

The following papers were presented and referred to Committees:

"Observations on the Eocene Lignite Formation of the United States," and "Catalogue of the Eocene Annelides, etc." By T. A. Conrad.

"Descriptions of three new species of Exotic Uniones." By Isaac Lea.

The Secretary read the following:

1865.]

*Extract from the last Will and Testament of THOMAS B. WILSON, deceased, late of Newark, State of Delaware, and on record in the Register's Office, Newcastle, Delaware.*

"I will and bequeath to the Academy of Natural Sciences, of Philadelphia, my collection of Birds and all my other specimens of Natural History deposited by me in the hall or building of the said Academy of Natural Sciences, on Broad street, Philadelphia. And I further give and bequeath to the said Academy of Natural Sciences of Philadelphia, the sum of Ten Thousand dollars, to be by them invested in some safe and productive fund; and as often as it may be necessary to change the said investment, to re-invest the said sum in like manner; which fund shall be called the Library Fund, and the income therefrom shall be exclusively appropriated to the purposes, preservation and income of the Library of the said Academy, in the following manner: Three hundred dollars of the yearly income arising therefrom, I direct to be paid as a yearly salary to a Librarian, to be appointed by the said Academy, whose duties shall be by them fixed and determined; and the residue of the yearly income arising from the said fund I direct to be applied, *firstly*, to the continuance, by purchase, of such works published periodically or in numbers as are now contained in and belonging to the Library of the said Academy. And, *secondly*, to the purchase and procuring of such works relating to Natural History as may be designated and selected by the said Librarian and the Library Committee of the said Academy jointly."

The said Will is dated the seventeenth day of March, Anno Domini, one thousand eight hundred and fifty-four, (1854.)

Attest,

RATHMELL WILSON,  
Surviving Executor.

April 25th.

The President, DR. BRIDGES, in the Chair.

Eighteen members present.

On the favorable report of the respective Committees, the following papers were ordered to be published:

Diagnoses Specierum et Varietatum novarum MOLUSCORUM, prope Sinum Pugetianum a Kennerlie Doctore, nuper decesso, collectarum.

SCRIBEBAT PHILIP P. CARPENTER, B.A., PH.D.

Academice Alumnus Correspondens.

SRÆNIA OVOIDEA, n. s.

S. t. parvâ, albidâ, ovoideâ; epidermide cinereâ, parum rugosâ, indutâ; marginibus, antico et ventrali regulariter excurvatis; dorsalibus rectis, ad angulum circiter 150°; parte posticâ angustiore, obtuse angulatâ, parum truncatâ; umbonibus prominentibus, circiter ad duas inter quinque partes totius longitudinis sitis; intus, laminâ cartilagineâ latâ, parum extante; sinu pallii ovali, usque ad medium interstitii porrecto. Long. .3, lat. .16, alt. .09, *pell.*

*Hab.*—In sinu Pugetiano specimen unicum piscavit Kennerley.

A "Sph. ?Binghami" Searles Wood Crag Moll., vix differt.

NEBRA PECTINATA, n. s.

N. t. globosâ, albidâ, subdiaphanâ; epidermide tenui indutâ; ventraliter antice productâ, postice subito angustato, rostrato; rostro haud insculpto, duabus inter quinque partes totius longitudinis equante; parte globosâ acute costatâ; costis posticis paullum majoribus, magis distantibus; margines dor-

[April,

sales versus obsoletis; interstitia laeta, quadratis, minutissime concentricè striatis; costis principalibus t. jun. xii.—xv., adultâ, aliis crebre intercalantibus, circ. xxx., quarum primi majores: intus, laminâ cartilagineâ curtâ, sub umbones celatâ; dente postico satis elongato, regione adductoris intus clavicolato; cicatricibus adductoribus subrotundatis, deorsum sitis; sinu pallii parvo; lato: margine à costis pectinato. Long. .24, lat. .14, alt. .12.

*Hab.*—In sinu Pugetiano specimen junior legit Kennerley. Apud insulam Catalinam et Sanct. Barbaram adultum piscavit Cooper.

### Genus PANDORA.

#### Subgenus KENNERLIA.

Testa Pandoris veris simillima; cartilago ossiculam gerens; ligamentum elongatum, tenuissimum; lamina externa prismatica valvâ planatâ plerumque radiatim sulcata; cardo simplex; linea pallii haud sinuata.

*Ex.*—*Kennerlia filosa*.

*Kennerlia bicarinata*. [?An *P. bilirata*, Conr., æqualis.]

*Kennerlia glacialis*.

#### KENNERLIA FILOSA, n. s.

*K.* t. tenui, planoconvexâ, maxime rostratâ; marginibus dorsalibus rectis, ad angulum circ. 160°; ventrali regulariter et modice excurvato, postice vix sinuato; epidermide olivaceâ, plerumque erosa, postice corrugatâ; laminâ externâ prismaticâ spongiosâ, valvâ planatâ radiatim sulcatâ, (quasi filosâ,) sulcis distantibus; valvâ convexâ costâ obtussissimâ postice decurrente; lineis seu undis incrementi conspicuis: intus, dente cardinali uno, parvo, extante; callositate claviculoideâ anticâ, margini contiguâ; fossâ cartilagineâ postice sitâ; cicatricibus adductoribus rotundatis, margini dorsali contiguis; lineâ pallii simplici. Long. .8, lat. .4, alt. .12.

*Hab.*—In sinu Pugetiano satis rarè piscavit Kennerley.

#### PSAMMOBIA RUBRODIATA, (Nutt. MS.)

*Ps.* t. seu omnino lilacinâ, seu albidâ, lilacino plus minusve radiatâ; magnâ, solidâ, latâ, subæquilaterali, haud planatâ, rugis incrementi irregularibus instructâ; epidermide olivaceâ indutâ; marginibus, dorsalibus antice et postice rectis, ad angulum 160°, umbonibus prominentibus, obtusis; ventrali subplanato, antico rotundato, postico subquadrato: intus, albidâ; dentibus cardinalibus utrâque valvâ duobus, parvis; nymphis planatis, latioribus, ligamento extante; cicatricibus adductoribus, antico ovali, postico rotundato; sinu pallii subquadratâ, usque ad medium porrectâ, à margine ventrali lineâ solum separatâ; costis duabus ab umbonibus ad marginem internum cicatricum diagonaliter decurrentibus.

—“*Sanguinolaria rubro-radiata*, Conr.” [ubi] Nutt. MS.; B. A. Rep., p. 195.

#### MACOMA YOLDIFORMIS, n. s.

*M.* t. parvâ, valde transversâ, subplanatâ, yoldiformi; albâ, tenui, subdiaphanâ, politissimâ; epidermide nitente, pallide stramineâ indutâ; lineis incrementi, postice conspicuis, exceptis, lævi; parum inæquilaterali, umbonibus postice inflectis; marginibus undique (regione ligamenti exceptâ) regulariter excurvatis: intus, nymphâ ligamentali concavâ, subcelatâ; postice sectâ, dein parum alata; dentibus cardinalibus valvâ sinistrâ ii., quorum unus bifidus; margine dorsali antico excurvato; sinu pallii obscure triangulato, paulo plus quam duas trientes interstitii inter cicatrices adductores minores porrecto. Long. .68, lat. .4, alt. .15.

*Hab.*—In Pacifico Boreali primum piscavit Belcher: dein valvas duas in sinu Pugetiano, Kennerley: postea prope San Diegonem, Cooper: rarissime. 1865.]

## MACOMA (?var.) EXPANSA.

M. t. "*M. proxima*" simili, sed majore, multo tenuiore; antice minus, postice plus expansa, regulariter excurvatâ; t. jun. subdiaphanâ, subepidermidem tenuem, stramineam, subnacreâ; t. adultâ albâ, nitidâ; dentibus cardinalibus ii.—i. minimis, haud bifidis; sinu pallii valvâ alterâ per tres quadrantes, alterâ per quinque inter septem partes interstitii porrecto. Long. 1.55, lat. 1.13, alt. .5.

*Hab.*—In sinu Pugetiano rarissime legit Kennerley.

A "*M. lata*, Gmel." Desh. MS. in Mus. Brit. vix differt, specimine Grœnlandico; sed *M. latæ* et *calcoræ* in Mus. Cumingiano texturâ et dentibus haud convenit. Species quædam hujusce formæ, extus similiores, intus dentibus et sinu pallii satis differunt.

## (TELLINA) ANGULUS MODESTUS, n. s.

A. t. "*A. tenero*," Sayii simillimâ; sed callositate conspicuâ internâ anticâ ab umbonibus decurrente, sinum pallii et cicatricem adductorem utrâque valvâ separante; parvâ, subdiaphanâ, nitidissimâ, donaciformi; epidermide corneâ tenuissimâ, striulis incrementi, plus minusve conspicuis, indutâ; margine antico dorsali subplanato; umbonibus extantibus; areâ posticâ truncatâ, haud acute definitâ; margine ventrali subplanatâ: intus, dentibus cardinalibus utrâque valvâ ii., quorum alternati bifidi; valvâ sinistrâ lat. antico curto, extante, contiguo, posticis nullis; sinu pallii usque ad callositatem porrecto; nymphis paullum concavis. Long. .36, lat. .22, alt. .08.

*Hab.*—In sinu Pugetiano, specimina duo juniora legit Kennerley.

## ANGULUS MODESTUS, var. OBTUSUS.

A. t. "*A. modesto*" simili; sed majore, umbonibus obtusis, vix donaciformi, marginibus dorsalibus et ventrali excurvatis; candidiore, vix diaphanâ; epidermide pallidissime stramineâ. Long. .72, lat. .44, alt. .15.

*Hab.*—In sinu Pugetiano legit Kennerley; apud "Neah Bay," Swan; prope S. Pedro, Cooper.

## ?CLEMENCIA SUBDIAPHANA, n. s.

?C. t. ovali, quoad genus valde transversâ, tumidâ, tenuissimâ; pallide cinereâ, epidermide pallide stramineâ; subdiaphanâ, sed subcalcareâ, haud porcellanâ; lævi, nisi striis incrementi; haud lunulatâ, umbonibus satis prominentibus: intus, valvâ dextrâ, dentibus anticis duobus acutis, contiguis, elevatis, postico elongato, acuto, bifido, ligamento parallelo; valvâ sinistrâ dentibus anticis duobus, umbonem versus junctis, acutis, divergentibus, postico elongato, acuto, simplici; sinu pallii, ut in *Dosiniâ*, angusto, angulato, per dimidium interstitii umbones versus porrecto. Long. .72, lat. .58, alt. .34.

*Hab.*—In sinu Pugetiano specimina quædam, plerumque juniora, piscavit Kennerley: ex insulâ Vancouver, specimen fractum portavit Forbes.

Texturâ *Lucinopsei* convenit; cardine, *Clementiæ*; formâ, *Saxidomo* squâido juniori.

## Genus PSEPHIS.\*

Animal Veneri simile, sed viviparum.

Testa inter *Pachydesma* et *Circem* intermedia; lævis, seu concentricè sculpta, nitida; cardine dentibus iii.—iii. variantibus, quorum anticus sæpe porrectus; marginibus haud crenulatis, dorsali intus sulcato; sinu pallii parvo, lato, interdum obsolete; ligamento tenui, umbones obtusus circum-eunte.

\* Th. ~~Levis~~, & calculus.



Exemplum typicum : *Psephis Lordi* = *Chione Lordi*, Baird, Proc. Zool. Soc., 1863, p. 69.

*Hab.*—In sinu Pugetiano primum legit Kennerley : postea, in insulâ Vancouver legit Lord : in insulâ Catalinâ, Cooper.

VENUS KENNERLEYI, n. s.

V. t. ovali, solidâ, calcareâ, squalide albâ ; marginibus æqualiter excurvatis ; valde inæquilaterali, haud tumidâ ; rugis concentricis, validis, crebris, irregularibus, haud acutis, instructâ ; interstitiis concentricis striatis, (t. juniore suborbiculari, striis radiantibus ornatâ ;) lunulâ lineis impressis definitâ, rugis appressis instructâ ; areâ haud definitâ ; intus, dentibus utrâque valvâ iii., quorum alterâ i. alterâ ii. plus minusve bifidis ; fulchro valido ; cicatricibus muscularibus validis ; sinnu pallii parvo, anguste angulato ; marginibus tenuiter crenulatis. Long. 2·5, lat. 1·8, alt. 1·25.

*Hab.*—In sinu Pugetiano legit Kennerley : testas juniores, "*V. astarteæ*" Midd. similes, legerunt juxta Neeah Bay, Swannii Indianuli.

ASTARTE (? COMPRESSA, var.) COMPACTA.

A. t. "*A. compressæ*" simili, sed compactâ, minus transversâ ; hiris concentricis expressis, paucioribus, marginem posticam versus obsolete ; umbonibus valde prominentibus, acutioribus ; marginibus dorsalibus rectis, ad angulum 100° ; lunulâ minus impressâ, longiore ; areâ ligamentali minus angulatâ ; dente laterali antico valvâ dextrâ magis extante. Long. ·4, lat. ·33, div. ·21.

*Hab.*—In sinu Pugetiano specimen unicum piscavit Kennerley.

LUCINA TENUSCULPTA, n. s.

L. t. "*L. Mazatlanicæ*" formâ simili ; sed magis convexâ, sculpturâ multo tenuiore ; epidermide olivaceo-cinereâ indutâ ; t. juniore lævi ; postea, rugis incrementi concentricis, plus minusve conspicuis, distantibus, irregularibus ; costulis radiantibus subobsoletis, latis, crebrioribus, antice et postice evanidis ; areâ posticâ vix subquadratâ, haud definitâ : intus, dentibus cardinalibus et lateralibus normalibus, satis extantibus ; ligamento externo, elongato ; cicatrice anticâ normaliter prolongatâ ; margine crenulato. Long. ·23, lat. ·21, alt. ·13.

*Hab.*—In sinu Pugetiano legit Kennerley.

CRYPTODON SERRICATUS, n. s.

C. t. parvâ, subplanatâ, subcirculari, tenui, albâ, haud flexuosâ ; epidermide tenuissimâ, vix stramineâ, serricatâ, indutâ ; lævi, seu lineis incrementi vix ornatâ, nitente ; suborbiculari, seu ventraliter productâ ; marginibus undique valde et regulariter rotundatis, regione lunulari incurvatâ ; umbonibus antice hamatis ; lunulâ planatâ, haud exacte definitâ : intus, ligamento tenui, omnino celato ; dentibus cardinalibus in utrâque valvâ uno, extante, lateribus nullis ; cicatricibus adductoribus subovalibus, haud prolongatis ; lineâ pallii à margine haud crenato satis remotâ. Long. ·18, lat. ·18, alt. ·1.

*Hab.*—In sinu Pugetiano legit Kennerley : in insulâ Vancouver, Swannii Indianuli.

PYTHINA RUGIFERA, n. s.

P. t. majore, tenuissimâ, valde transversâ, subquadratâ, vix inæquilaterali ; lineis incrementi et epidermide rugosâ, confertissime laminatâ, ornatâ ; umbonibus latis, valde prominentibus, antice flutentibus ; marginibus, dorsalibus satis regulariter excurvatis, regione posticâ paulum majore ; ventralibus planato, seu medio concavo : intus, cardine maxime delicatulo ; dente cardi-  
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nali uno minore, claviculâ anticâ laterali inconspicuâ; laterali postice nulle. Long. .77, lat. .44, alt. .3.

*Hab.*—In sinu Pugetiano specimina duo, (quorum unum fractum,) piscavit Kennerley.

Inter Pythinas typicas et Kellias locum tenet.

TELLIMYA TUMIDA, n. s.

T. t. subtriangulari, subovatâ, lævi, solidiore, tumidiore, valde inæquilatâ; cinereâ, epidermide pallide olivaceâ, concentricè striatâ indatâ; marginibus dorsalibus subrectis, ventrali excurvato: intus, dentibus cardinalibus valvâ sinistrâ validissimis, curtis, extantibus, postico longiore; valvâ dextrâ callositatibus marginalibus, dentibus nullis; cartilagine validiore, ossiculum parvum in medio gerente; cicatricibus adductoribus à cardine valde remotis. Long. .155, lat. .125, alt. .06.

*Hab.*—In sinu Pugetiano specimen unicum legit Kennerley; apud Neenah Bay, Swan; prope San Diagonem, Cooper.

LINA FOSEA, Baird.

L. t. "*L. minutæ*" similis; sed parte anticâ minore; posticâ magis porrectâ, angustiore; umbonibus parvis, valde prominentibus; livulis concentricis crebris, haud expressis, postice et testâ adultâ ventraliter omnino obsolete; regione siphonali haud liratâ, obtuse biangulatâ, angulis contiguis, subnodosis; regionibus dorsalibus utroque latere lævibus; parte anticâ sulcæ radiante obsolete definitâ, liris illuc interdum interruptis: intus, dentibus cardinalibus utroque latere xiv., posticis magis elongatis; sinu pallii minime.

*Hab.*—In sinu Pugetiano specimen unicum legit Kennerley: in porto Esquimalto, idem, Lyall.

Proc. Zool. Soc., 1863, p. 71. = *L. foveata*, Baird MS., in Mus. Brit.

PECTEN (?var.) HINDSII.

P. t. "*P. hastati*" varietatibus simili, sed latiore; radiis multo crebrioribus, æqualibus, lævioribus, minoribus, ventraliter bifurcantibus; interstitiis lætis, minutissime granulosis; intus albidâ. Long. 1.6, lat. 1.7, alt. .57.

*Hab.*—In sinu Pugetiano juniorem legit U. S. E. E., adultum Kennerley: in insulâ Vancouver legit Lord.

= *P. Fabricii*, Gld. in B. A. Rep., p. 211, (non Phil. = *P. islandicus*, jun.)

TORNATINA EXIMA, Baird.

T. t. cylindraceâ, majore, lævi, pallide albolutescente; epidermide stramineâ, spiraliter tenuissime striulatâ, indatâ; spirâ sæpius erosâ; auris angustis, acutissime canaliculatis; labro acuto, antice sinuato, medio porrecto, postice exciso, supra suturam valde et acute elevato; aperturâ antice valde elongatâ; columellâ valde excavatâ, antrorsum labrum versus arcuatâ; labio tenui; plicâ angustissimâ, obsolete, parieti appressâ. Long. .26, lat. .12.

*Hab.*—In sinu Pugetiano primum legit Kennerley: postea in insulâ Vancouver legit Lord.

Speciminibus typicis comparitis, conchiliis Kennerlianas *Bullina eximia*, Baird, in Proc. Zool. Soc., 1863, p. 67, conspecificas esse certissime constat.

CYLICHA (?CYLINDRACHA, var.) ATTONSA.

C. t. "*C. cylindraceæ*" aliter simillima; sed postice rotundatâ, haud umbilicatâ, vix lacunatâ, labro regulariter incurvato. Long. .38, lat. .15.

*Hab.*—In sinu Pugetiano specimen unicum legit Kennerley.

Specimina Californica, à Jewett Cooperque collecta, *C. cylindraceæ* typicæ magis conveniunt.

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## DENTALIUM RECTIUS, n. s.

D. t. valde elongatâ, valde tereti, lentissime augente, vix arcuatâ; levi, tenuiore, albidâ, subdiaphanâ, valde nitente; aperturam versus tenuissimâ. Long. 1·9, lat. ·13.

*Hab.*—In sinu Pugetiano legit Kennerley.

Varinâ *D. eburneo*, Singaporensi, convenit; sed annulis falacibus caran, texturâ valde differt.

## MOPALIA KENNERLEYI, n. s.

M. t. "*M. muscose*" formâ, indole, sculpturâque simili; sed multo magis elevatâ; plus minusve rubente, plus minusve olivaceo variegatâ, intus pallidâ; granis lateralibus fere æqualibus; liris centralibus haud acutis, interstitiis rarius cancellatis; suturis undatis, apicibus valvarum prominentibus; valvâ anticâ octoradiatâ, radiis granulosis, margine octies inciso; valvis intermediis utrâque semel incisis; valvâ posticâ mucrone obsoleto, sinu postico alto, angustiore, marginibus anticis valde alatis, lateribus posticis semel incisis.

*Hab.*—In sinu Pugetiano: sp. unicum legit Kennerley.

## ?MOPALIA SINUATA, n. s.

?M. t. parvâ, subelongatâ, elevatâ, jugo angulato; rubido et cæruleo eleganter maculatâ; valvis elongatis, subquadratis; areis lateralibus costâ angustâ, subelevatâ, granulosa, utrâque definitis; suturis quoque granulosis; totâ superficie clarissime reticulatâ, punctis areis centralibus valde, areis lateralibus et valvis terminalibus modice impressis; valvis terminalibus ut in areis lateralibus sculptis, costis acutis radiantibus, interstitiis reticulatis; valvâ posticâ maxime incisâ, sinu alto, acuto mucrone tenuis haud conspicuam effosâ: intus rosaceâ; marginibus apicinis granulosis totâ longitudine intortis; sinu laminarum suturalium parvo, angusto; laminis externis, valvis centralibus semel incisis; valvâ anticâ, fissuris circiter viii., costis convenientibus; valvâ posticâ, fissurâ laterali utrâque costæ conveniente, postice maxime sinuatâ: limbo pallii coriaceo, pilulis paucis; poro rotundato parvo suturis utroque latere conveniente.

*Hab.*—In sinu Pugetiano specimina duo legit Kennerley.

Mopaliis typicus structurâ valvæ posticæ convenit: poris suturalibus vix definitis, differt.

## ?MOPALIA IMPORCATA, n. s.

?M. t. parvâ, valde elevatâ, satis elongatâ; jugo acuto, rectangulato; pallidâ, rufotinctâ; areis lateralibus, costâ elevatâ, dense granulosa, definitis; suturis dense granosis, marginibus intus implicatis; valvâ anticâ circiter octies granoso-costatâ; arearum lateralium et valvæ anticæ interstitiis intricatim ruguloso-indentatis; areis centralibus costis longitudinalibus crebris, validissimis, acutis, subparallela, interstitiis crenulato-decussatis; valvâ posticâ mucrone haud conspicuo, submarginali, sinu parvo, angusto: intus, sinu laminarum suturalium angusto: valvis centralibus fissurâ unâ; valvâ anticâ fissuris?—; valvâ posticâ fissurâ utrâque unâ, postice sinu parvo, angulato: limbo coriaceo, poris suturalibus aliisque huc et illuc sparsis, minutis, setulis albidis instructis.

*Hab.*—In sinu Pugetiano specimina duo legit Kennerley.

Ut in ?M. sinuatâ, à Mopaliis typicis differt.

## ISOENOCHITON (TRACHYDERMON) RETIPOROSUS, n. s.

I. t. parvâ, subelongatâ, cinereâ, valde elevatâ, jugo arcuato; valvis subquadratis, apicibus celatis, marginibus suturalibus intus replicatis; areis lateralibus parum definitis, costulis iii.—vi. obsoletis, rotundatis, huc ad 1865.]

illuc grans acutis, expressis, instructis; areis centralibus omnino scrobiculatis, interstitiis parvis, alte punctatis; valvis terminalibus costulis crebris, angustis, acutioribus; mucrone parum conspicuo, antrorsum sito: intus, sinu suturali lato; laminis, utroque latere semel, valvis terminalibus circ. xii. incis: limbo pallii granuloso, granulis confertis, minimis, vix elongatis, vix regularibus, haud sculptis. Long. 44, lat. 28, div. 90°.

*Hab.*—In sinu Pugetiano specimen unicum legit Kennerley.

Formâ *I. interincto*, Gld. et *I. scrobiculato*, Midd. convenit; indole sculpturæ differt.

ISCHNOCHITON (TRACHYDERMON) TRIFIDIS, n. s.

I. t. elevatâ, ovali, rubidâ; valvis latis, subquadratis, apicibus vix intortis; areis lateralibus subelevatis, costis obsoletis rotundatis ii.—iv.; areis centralibus punctis distantibus, valde impressis; valvis terminalibus ut in areis lateralibus costatis; valvâ posticâ mucrone submedianâ, haud elevatâ: intus albidâ, subrosacâ; valvis utrâque latere maculo aurantio elongato ornatis, sinuibus centralibus parvis, expansis; marginibus externis subgrundâ typice obtectis; laminis lateralibus bis, terminalibus circiter xii. incis: limbo pallii, granuloso, grans ovalibus, vix imbricatis haud striatis. Long. 75, lat. 45, div. 110°.

*Hab.*—In sinu Pugetiano specimen unicum piscavit Kennerley.

ISCHNOCHITON (TRACHYDERMON) PSEUDODENTIENS, ? n. s.

I. t. parvâ, ovatâ, subelevata, jugo angulato; cinereâ, olivaceo eleganter maculatâ, suturis albedo et fusco-olivaceo haud regulariter tessellatis; areis lateralibus haud valde definitis; totâ superficie granulis creberrimis instructâ; apicibus valvarum distinctis; mucrone conspicuo, submediano: intus, sinu suturali lato, medio planato: subgrundis parvis, haud extantibus, subpongiosis; laminis lateralibus unofissatis; terminalibus quoad xi., valde obtusis: limbo pallii minute granuloso, grans lævibus, confertis, subovalibus. Long. 44, lat. 24, div. 110°.

*Hab.*—In sinu Pugetiano legerunt primum *Expediitio Explorans*, demum Kennerley: in insulâ Vancouver legit Lord: apud San Diegonem legit Cooper.

Specimini typicali "*Ch. dentiens*, Gouldii" convenit: à diagnosi et figurâ, haud dentiens, differt.

ISCHNOCHITON (TRACHYDERMON) FLECFENS, n. s.

I. t. parvâ, subelongatâ, roseâ, elevatâ; jugo acuto; areis lateralibus vix definitis; marginibus valvarum excurvatis, suturis incurvatis, apicibus valde prominentibus; valvis granulis minutis, haud crebris, subradiatim sparsis, omninoque minutissime punctulatis; mucrone conspicuo, antico: intus, sinu suturali lato, planato; subgrundis haud porrectis; laminis lateralibus unoterminalibus quoad xi.—fissatis: limbo pallii vix minutissime granulato. Long. 35, lat. 24, div. 110°.

*Hab.*—In sinu Pugetiano legit Kennerley: in insulâ Vancouver legit Lord: prope Monterey, Taylor: apud San Diegonem, Cooper.

LEPETA CÆCOIDES, n. s.

L. t. "*L. cæcæ*" similis; t. albâ, ancyloideâ, tenui, juniore subdiaphanâ; apice obtuso, anticè verso; parte posticâ parum excurvatâ; lateribus haud compressis; margine regulariter ovato; totâ superficie sub lente minutissime striatâ, striulis valde distantibus, haud elevatis, haud granulatis, subobsoletis; cicatrice musculari haud impressâ. Long. (t. adoleo.) 45, lat. 37, alt. 19 (speciminis multo majoris pars solum superest: long. 94, lat. 73, alt. 55,) div. 90°.

*Hab.*—Specimina juniora perpauca viventia in sinu Pugetiano piscavit Kennerley: ex insulis Farallonibus adulta affertur, teste Darbishire.

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## CALLIOSTOMA (? var.) VARIEGATUM.

*C. t. parvâ*, conicâ, variegatâ; nucleo rosaceo; anfr. vi. planatis, suturis haud impressis; costulis in spirâ iii. regularibus, nodulosis; nodulis albidis, subdistantibus; interstitiis elegantissime rosaceis; lirulis basalibus viii. haud nodulosis, rosaceo maculatis. Long. .24, long. spir. .13, lat. .21, div. 50°.

*Hab.*—Puget Sd., sp. un. legit *Kennerley*.

This may prove to be an extreme variety of *Cal. annulatum*, *Martyn*.

## MARGARITA (? var.) TENNISULPTA.

*M. t. "M. Vahlîi"* formâ, colore, et operculo simillimâ; sed striulis spirallibus, plus minusve obsolete cinctâ, quarum iv.-vi. in spirâ monstrantur. Long. .22, long. spir. .11, lat. .13, div. 70°.

*Hab.*—Puget Sd., *Kennerley*. Neeah Bay, *Swan*.

Except in the very faint spiral sculpture, which does not always appear a constant character in *Margaritæ* (*v. M. undulata* in *Fbs.* and *Hanl. Br. Moll.*), these shells might stand for *M. Vahlîi*, a ? variety of which was found sparingly by Dr. *Kennerley*. They are sometimes painted with infrasutural flames of darker ash. Both the smooth and the striated forms have a prominent spiral rib on the whorls of the operculum.

## MARGARITA LIRULATA, n. s.

*M. t. parvâ*, cineraceâ, tenui, tumentiore, nacreo rosaceo; anfr. v. plerumque subdepressis, suturis distinctis; interdum purpureo-fusco pallide maculatâ; lirulis acutis spirallibus haud elevatis, supra valde distantibus, in spirâ ii., circa basim rotundatum circ. viii.; aperturâ subquadratâ; umbilico magno, infundibuliformi, angulato; interstitiis lirularum lævibus, seu ab incrementis epidermidis decussatis: operculo tenuissimo, pallido, subplanato, suturis distinctis. Long. .18, long. spir. .07, lat. .2, div. 80°.

*Hab.*—Puget Sd., *Kennerley*.

? *Var. a. subelevata*; t. elatiore; colore livido, intensiore; lirulis vix acutis.

*Hab.*—Puget Sd., *Kennerley*. Neeah Bay, *Swan*.

? *Var. β. obsoleta*; t. ut in ? *var. subelevata*; lirulis evanescentibus; operculo planato, tenuissimo, suturis indistinctis.

*Hab.*—Neeah Bay, *Swan*.

? *Var. γ. conica*; t. valde elevatâ; lirulis acutis, aliis interdum intercalantibus; umbilico parvo. Long. .33, long. spir. .2, lat. .25, div. 58°.

*Hab.*—Puget Sd., *Kennerley*, sp. un.

The shells above described constitute what might be called a Darwinian group of specific forms. With the exception of the typical shells dredged by Dr. *Kennerley*, they are all in very bad condition. The Pugetian specimens are flattened, with open umbilicus, as might be expected from quiet water. Two specimens, however, form an exact transition to the Neeah Bay shells, of which a fair number (*var. a*) were sent by Mr. *Swan*, though worn and generally decorticated. They are more elevated, with fainter sculpture; and pass, by insensible gradations, into *M. tennisculpta*, the two principal spiral lines becoming evanescent, and a few others intercalating. In this state (*var. β*) the species can only be separated by the operculum, which is pale and thin, and destitute of the strongly expressed rib of the '*Vahlîi*' group. A third form (*var. γ*) would certainly claim specific rank, but for the intermediate series of *a* and *β*. The diagnostic characters for the whole series are the smooth operculum, the eight narrow riblets round the base, with angular umbilicus and the sharp, narrow, principal riblets above, with wide interspaces, smooth except from the lines of growth, which are principally

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visible in the epidermis. There may be three (so-called) species in the group, viz.: *lirulata*, *subelevata* and *confusa*.

*MARGARITA INFLATA.*

*M. t. tumida*, tenui, albidâ, narceo pallide aureso; anfr. vi. valde inflatis, suturis ad angulum fere rectum impressis; totâ superficie tenuissime spiralliter lirulatâ; lirulis acutis, haud elevatis; in spirâ circ. viii., minoribus saepe intercalantibus; interstitiis à lineis incrementi extantibus creberrimis tenuissime decussatis; basi obtuse subangulatâ, striis creberrimis circ. xx. ornatâ; aperturâ subquadratâ; columellâ arcuatâ; umbilico infundibuliformi, laevi, angulato: operculo tenui, planato, suturis distinctis. Long. .44, long. spir. .32, lat. .43, div. 35°.

*Hab.*—Puget Sd., *Kennerley*. Vancouver, *Lyall*. Neesh Bay, *Swann*.

Only two adult specimens of this remarkably elegant species have been seen. It resembles the shell from Greenland called *M. striata*, *Brod. and Soy.*, in the British Museum, but that under the same name from Behring Straits (appears distinct. In many respects it is like *M. undulata*, but differs in the greater swelling of the whorls meeting at a nearly rectangular suture, in the far more delicate sculpture without waves the keeling of the umbilicus and the bend in the pillar which causes a slight spiral hollow inside the umbilical rib.

*MESALIA LACTEOLA*, ? n. s.

*M. t. parva*, tereti, tenui, albidâ; epidermide tenui, flavidâ, indutâ; anfr. x. rotundatis, suturis valde impressis, laevibus; costis circ. xii. radiantibus, tumetibus, suturam versus evanidis, interstitiis parvis; costis spiralibus rotundatis, costas radiantes transeuntibus, supra spiram iii. validioribus, aliis interdum intercalantibus; costulis suturalibus parvis, antice ii.; basi rotundatâ, vix striatâ; columellâ rectâ, pannum effusâ; labro tenuissimo, parum arcuato. Long. .33, long. spir. .24, lat. .14, div. 36°.

*Hab.*—In sinu Pugetiano legit *Kennerley*. In insulâ Vancouver legit *Forbes*. Ance "*M. lacteola*" varietas insignis, sculpturae indole satis discrepans.

*MESALIA* (? *LACTEOLA*, var.) *SUBPLANATA.*

*M. t. "M. lacteola"* simili; sed sculpturâ minus extante anfractibus subplanatis; costis radiantibus pluribus minoribus, costulis spiralibus interdum intercalantibus, aperturam versus saepe obsoleteis.

*Hab.*—In sinu Pugetiano specimina viventia sed maxime erosa legit *Kennerley*: juxta "Neesh Bay" legerant Indianuli, Swannii discipuli.

*RISSOA COMPACTA*, n. s.

*R. t. spatâ, rufosca*, haud tarritâ, compactâ, marginibus spirae exarceatis; anfr. nucleosis iii. globosis, laevibus, apice mamillato; normalibus iii. subplanatis, latis; lirulis spiralibus obtusis circiter xv., quarum circ. vi. in spirâ mesentantur, interstitiis vix aequantibus; lirulis radiantibus circ. xxx., peripheriam tenus evanidis, anfractibus primis superantibus, anfractu ultimo saepe obsoleteis; basi rotundatâ, haud (nisi testâ juniere) umbilicatâ; aperturâ suborbiculari, peritremati continuo; operculo tenui, paucispirali, rapidissime augens. Long. .06, long. spir. .04, lat. .045, div. 45°.

*Hab.*—In sinu Pugetiano satis abundanter legit *Kennerley*; prope Neesh Bay, Swannii discipuli.

*DRILLIA INOISA*, n. s.

*D. t. "D. inoisa"* formâ et indole simili; sed cinerea, rufoscae copiose spiralliter nucleatâ; anfr. nucleosis majoribus, subplanatis; anfr. normalibus vii. subplanatis, spiralliter subobsolete costatis; sulcis in spirâ circiter viii., quarum quarta radiatim sinuata; canali quoad genus longiore, apertâ; se-

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lumellâ arcuatâ; labio distincto; labro tenui, parum sinuato; epidermide subfugaci, lamina incrementi subragosâ; operculo pyriformi, haud angulato, apice antico. Long. 1.18, long. spir. .65, lat. .4, div. 30°.

*Hab.*—In sinu Pugetiano legit Kennerley: prope "Nesah Bay" legerunt Swannii Indianuli.

A Drilliis typicis sine minimo et operculo haud angulato conspicue differt: Chionella, Grayi, magis convenit.

*DRILLIA CANCELLATA*, ? n. s.

D. t. "*D. incisz juniore*" simili, sed omnino albido, sculpturâ elevatâ, haud cancellata epidermide tenui; anfr. nucleosis ? ..... [detritis;] normalibus iv. planatis, suturis distinctis; costulis radiantibus circ. xx. angustis, acutioribus, et costulis spiralibus subaequantibus, quarum circiter v. in spirâ monstrantur, eleganter cancellatis, ad intersectiones subnodalesis; aperturâ obovalli, in canalem longiorem, subarcuatam, apertam, productâ; labro acuto, medio producto, ad costulam spiralem ex suturâ tertiam eleganter sinuato, sinu altiore.

*Hab.*—In sinu Pugetiano duo specimina legit Kennerley; quorum altero labrum subcallosum, altero planatum.

*MANGELIA LEVIDENSIS*, n. s.

M. t. rudi, fusâ, elatior; anfr. nucleosis iii. subelongatis, vertice haud mamillato; anfr. normalibus vi. subplanatis, suturis distinctis, quarum primi costis radiantibus circiter xii. latis, interstitiis parvis, et costulis spiralibus crebrioribus, quarum v. magis insculptæ supra costas transeunt, rude ornantur; anfr. ultimis sculpturâ subobsoletâ; aperturâ elongatâ, subquadratâ in canalem brevem arcuatam productâ, intus hepaticâ; labro juxta suturam vix sinuato; labio vix conspicuo. Long. .86, long. spir. .53, lat. .29, div. 27°.

*Hab.*—In sinu Pugetiano legit Kennerley: prope "Nesah Bay" collegit, per Indianulos, Swan.

A Mangeliis typicis columellâ tortâ differt.

*BELA EXCURVATA*, ? n. s.

B. t. "*B. Tracyana*" simili, sed albâ, curtior, marginibus spiræ valde excurvatis; anfr. nucleosis ? ..... [erosis;] dein iv. normalibus, subplanatis, fere rectangularim prope suturas tabulatis; costis obtusis radiantibus circiter xviii., medio anfractis et prope suturam obsoletis, postice retrorsum valde arcuatis; sulcis spiralibus subdistantibus impressis, costas superantibus, in spirâ circiter v., postice evanidis, antice crebrioribus; aperturâ longius ovali, antice brevissime canaliculato, postice alte sinuato; labro acuto, medio valde excurvato; columellâ regione labii erosâ. Long. .26, long. spir. .13, lat. .15, div. 55°.

*Hab.*—In sinu Pugetiano ante decessum prematuram specimen unicum piscavit Kennerley, eheu deploratus!

*BELEA MACANE*, ? n. s.

B. t. "*B. polita*" simillimâ, sed minore; anfr. nucleosis stylinis, apice subdecliviter sito; anfr. normalibus xii. omnino planatis, maxime nitentibus, suturis nullis; albâ, rosaceo tinctâ; basi arcuatim rotundatâ; aperturâ ovali; labro postice, et paulum antice sinuato, calloso; labio calloso; columellâ vix tortâ. Long. .52, long. spir. .38, lat. .18, div. 25°.

*Hab.*—In sinu Pugetiano specimen juniore legit Kennerley. Juxta Nesah Bay idem legerunt Swannii Indianuli. Plurimos adultos viventes inter S. Pedronem et S. Diegoem, in insulâ quoque Catalinâ piscavit Cooper.

An *Be. polita* varietas Pacifica?

## OGINEBRA INTERFOSSA.

O. t. satis elongata, purpureo-fuscâ; anfr. nucleosis ii., lævibus, elongatis; anfr. normalibus v. convexis, suturis valde impressis; costis radiantibus subvaricosis circ. xi., et spiralibus subæquantibus, quarum iii.-v. in spirâ monstrantur, decussatâ; interstitiis altis, quadratis, laminulis incrementi, et interdum costulis spiralibus obtusis intercalantibus, sæpe ornatis; aperturâ ovatâ, labro (t. adultâ) intus dentato; canali satis longâ, sæpius clausâ. Long. .85, long. spir. .4, lat. .45, div. 60°.

Hab.—Neesah Bay, *Swan*: Vancouver, *Lord*, (named *Fusus orpheus*, as of Gld. in Br. Mus.)

Variat.: t. *atropurpureâ*; costis spiralibus distantibus, in spirâ duabus, foveis majoribus. Variat quoque t. albido zonatâ.

## ?CHRYSODOMUS RECTIROSTRIS, n. s.

?Chr. t. parvâ, albida, carneo maculatâ, gracili epidermide tenui, corneâ indutâ; anfr. nucleosis? . . . [decollatis;] anfr. normalibus vi. planatis, suturis parum distinctis; adolescente, costulis radiantibus circiter xiv. latis, hæud expressis, adultâ obsolete; lineis spiralibus hæud conspicuis; aperturâ elongato-pyriformi, in canalem valde productum, apertum, rectum, subito attenuatâ; labro acuto, parum arcuato, hæud sinuato; labio inconspicuo. Long. .88, long. spir. .43, lat. .32, div. 33°.

Hab.—In sinu Pugetiano, specimen unicum legit Kennerley.

Aspectu Belam, formâ Perronam, nisi labro hæud sinuato, commemorat: characteribus plurimis subgeneri Siphoni convenit.

## Synopsis of the Genus POMOXYS, Raf.

BY THEODORE GILL.

In order to dissipate part of the confusion into which the nomenclature of this genus has fallen, and to make known several new species, the present article is submitted.

## Genus POMOXYS, (Raf.)

- I. Caudal peduncle with its height in front (.14) greater than its length (.11—12); anal fin extending backwards nearly to base of caudal. P. brevicauda.
- II. Caudal peduncle longer (.13—15) than high (.11—13); anal fin not passing beyond the second third of peduncle.
- Height exceeding three-tenths (.31) of length; head less than three-tenths (.24). P. intermedius.
- Height less than averaging three-tenths (.29) of length, and scarcely longer than head.
- Caudal peduncle slender (.15 long, .11½ high).  
First dorsal spine less than half (.02½) an eye's diameter. P. storerius.
- Caudal peduncle stout, little longer than high (.13½ long, .13 high). First dorsal spine equal to two-thirds (.04½) of an eye's diameter. P. protacanthus.

## POMOXYS BRVICAUDA, Gill.

D. VI. 15. A. VI. 17. P. 15.

6  
Scales (12—29—) 42 —.\*  
14

\* The twelfth and twenty-ninth scales of the lateral line, respectively, correspond with the vertical of the anterior and posterior ends of the dorsal fin. The total number of scales through which the lateral line runs, exclusive of those on the caudal fin, is forty-two. At the region of greatest height, there are six rows above and thirteen below the lateral line.

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This species is readily distinguished by its abbreviated caudal peduncle and the consequent extension of the anal fin backwards nearly to its end. The back is also considerably more gibbous and decurved than that of any congener.

4564. North Grand River, Livingston Co., Mo. Dr. Hoy.

*POMOXYS INTERMEDIUS* Gill.

D. VI. 15. A. VI. 17.

6  
Scales (12—31—) 45 —  
14

This species distinguished by its comparatively longer caudal peduncle and the height of the body, as well as by the smaller size of the scales.

*POMOXYS STORERII* Gill.

?*Pomoxis annularis* Raf. ? Ag.

*Cichla storeria* Kirtland, MSS.

*Centrarchus hexacanthus* Cuv. et Val., *side Storer* (nec Cuv. et Val.)

*Pomoxis nitidus* Girard.

*Centrarchus nitidus* Günther.

D. VI. 15. A. VI. 17. P. 15.

6  
Scales (14—30—) 43 —  
14

The *Pomoxys storerii* is remarkable among all its known congeners on account of the slender caudal peduncle.

The species has been quite unfortunate in its nomenclature. It is possible that it is the species described and figured (1) by Rafinesque, but it would be an act of injustice to any other naturalist to suppose that his figure could so disagree with nature as does that of Rafinesque with the species in question. Agassiz has adopted Rafinesque's name for a species found in the Tennessee River,\* and, while he has remarked that it does not have the caudal ritz mentioned by that author, has not alluded to any other disagreement with the fish of Rafinesque; the normal inaccuracy of that man is, however, so well known, that Agassiz has doubtless considered it superfluous to allude to any such discrepancies, and, consequently nothing may be predicated from his silence on that subject.

The species was first intelligibly noticed by Dr. Kirtland; in the "Report on the Zoology of Ohio," p. 191, he introduced it under the name *Cichla Storeria*. Being subsequently informed by Dr. Storer "that Cuvier had previously described it in the third volume of his "Histoire Naturelle des Poissons," from specimens taken by Lesueur in the river Wabash," he referred it to the latter species, called *Centrarchus hexacanthus* Val. The fishes of Kirtland and the French naturalists, not only belong to different species, but even to different genera. The name *Cichla Storeria* must therefore be accepted as the specific appellation of the species described by Kirtland, if Rafinesque's is deemed unworthy of adoption.

Subsequently, the species was described and figured by Girard under the new name of *Pomoxis nitida*, while the name of Kirtland was retained as a synonym of the *Centrarchus hexacanthus*, which was erroneously called *Pomoxis sparoides*, and the name of Rafinesque was preserved for a third nominal species.

\* Agassiz remarks, that the species of the Tennessee River "agrees fully with the description given by Rafinesque of his *Pomoxis annularis*, with the sole exception of a golden ring at the base of the tail, which may be faded in the specimens sent by Dr. Newman from Huntsville;" but this agreement surely can scarcely extend to the figure, which remains unnoticed by Agassiz.

## POMOXYS PROTACANTHUS Gill.

D. VI. 15. A. VI. 17.

6

Scales (13—30—) 43 —.

14

The *Pomoxys protacanthus* may be at once distinguished among the other species here enumerated by the comparative elongation of the anterior dorsal and anal spines. A single specimen (4565), from Tarboro, North Carolina, is in the Smithsonian collection, and has no opercular spot. The absence of this latter furnishes another specific character, unless it has been obliterated by the alcohol.

The following table gives the relative proportions of the several species:

	4564	4563	4565
Extreme length.....	8½	6½	6½
Body—Greatest height.....	35	31	29
Height of tail behind anal fin.....	14	12	11½
Least height of tail.....	11½	10	9½
Length of tail.....	11½	13	15
Head—Greatest length.....	31	29	28
Height at pupil.....	15½	14	14
Length of snout.....	6½	6	6
Orbit—Diameter.....	5½	6	6
Dorsal—Length of base.....	27	25	24
Height at first spine.....	3	2½	2½
Height at last spine.....	11½	13½	14
Height at longest ray.....	16	16	16
Anal—Height at first spine.....	4	2½	2½
Height at last spine.....	9½	12	11
Caudal—Length of middle rays.....	17	18	17
Length of external rays.....	21	22	22
Pectoral—Length.....	16½	17	17
Ventral—Length.....	15	15	15

## On the Genus CAULOLATILUS.

BY THEODORE GILL.

## CAULOLATILUS Gill.

=*Caulolatilus* Gill, Proc. Academy of Natural Sciences, of Philadelphia, 1862, p. 340.

*Bekaya Cooper*, Proc. California Academy of Natural Sciences, iii. p. 70, 1864. *Latilus* sp. Cuv. et Val.

*Body* much compressed, elongated, with the height nearly uniform to the anus; thence gradually decreasing to the caudal peduncle, which is moderately narrowed.

*Scales* small, oblong, with a rather large central, minutely granular and striate area, from the posterior portion of which the rhipidal ridges radiate; and with a wide mucronated posterior border; the exposed surfaces are vertical, especially near the head.

*Lateral line* indistinct, parallel with the back; median on the caudal peduncle.

*Head* compressed, scarcely oblong, with the profile boldly decurved, the forehead flattened. Forehead behind cheeks and opercula, except interoperculum, covered with ctenoid scales like those of the body. *Eyes* subcircular, large. *Preorbital* bone elongated rhomboid, with the height less than the di-

[April,

iameter of the eye; cheeks longer than high. *Nostrils* approximated, simple; *Preoperculum* esinuate, pectinated. *Operculum* with a blunt, bony projection behind. *Suboperculum* narrow.

*Mouth* moderate, with the cleft little oblique. *Jaws* even; *supramaxillaries* nearly straight behind, and subtruncated at end. *Lips* thick, the lower attached by a frænum in front.

*Teeth* on the jaws alone, in a broad, villiform band in front, preceded by a row of larger acute ones continued to the corners of the mouth; the hindmost teeth enlarged canines directed forwards.

*Branchiostegal rays* six. (Branchial membrane well developed, and free below.)

*Dorsal fin* with seven or eight graduated, pungent spines, and rather numerous (22—27) uniform branched rays; antepenultimate normally longest. *Anal* similar to the soft dorsal, armed with one or two pungent spines; first spine, when present, extremely small.

*Caudal fin* emarginated, with its lobes pointed.

*Pectoral fins* well developed, longer than the ventrals.

*Ventrals* thoracic or subbrachial, with the spine slender but acute, and with second ray longest.

Type *Caulolatilus chryrops* Gill.

The genus *Caulolatilus* is widely separated from *Latilus* by the form of the body, structure of the scales and especially by the form of the head and the structure of the fins. It is also related to *Prolatilus*,\* but is readily distinguished by the general form, the form of the head, the thoracic position of the ventral fins, as well as the number of dorsal spines and form of the caudal fin.

*Caulolatilus* was first separated from *Latilus* in an article entitled "Remarks on the relations of the genera, and other groups of Cuban Fishes;" it was said to be distinguished by its form and the structure of the fins, and was founded for the reception of the *Latilus chryrops* C. et V.

Subsequently Dr. Cooper described as a new generic type allied to *Heterognathodon* Btkr., a Californian species of the same genus, and considered it "to be a very aberrant form of the Percoid family, having many characters of other orders.

Four species of the genus are known to me; their relations and differential characters may be expressed by the following scheme:

- |                        |                  |   |                       |
|------------------------|------------------|---|-----------------------|
| I. D. vii (-viii.) 24. | A. i. (ii.) 22.† | Profile quadrantiform.  | C. <i>chryrops</i> .  |
|                        |                  |   | C. <i>affinis</i> .   |
| II. D. viii. 25—26.    | A. ii. 25—26.    | Profile less decurved, the snout being produced.  |                       |
|                        | a.               | Dorsal spines behind longer than the space between the fin and lateral line; pectoral fin equal to distance from snout to middle of operculum | C. <i>anomalous</i> . |
|                        | β.               | Dorsal spines behind about equal to space between fin and lateral line; pectoral fin about three-fourths the length of the head (Jenyns.)     | C. <i>princeps</i> .  |

#### CAULOLATILUS CHRYSOPS.

*Latilus chryrops* C. et V., ix. 496; *Guict.*, in *Sagra*, tab. 2, f. 1; *Gtâr.*, ii. 283.

\* *Prolatilus* Gill, (type *Latilus Jugularis* Cuv., Val.) is distinguished by its general form, as well as the form of the head, scaly forehead and approximated eyes; few (4) dorsal spines, entire caudal and subjugular ventrals.

† My own enumeration of the dorsal and anal ray exactly coincides with Günther's; Cuvier assigns D. viii. 24. A. ii. 22. I cannot discover the small spine in front of the anal one, and there are certainly only seven dorsal spines.

*Caulolatilus chrysope* Gill, Phil. 1862, 340.

Hab.—West Indies.

D. vii. (-viii.) 24. A. i. (-ii.) 22. C. v. 1, 7, 6, 1, v. P. 18. V. L. 5.

*CAULOLATILUS AFFINIS* Gill.

In a young specimen the following peculiarities are exhibited :

The profile describes the outline of a quadrant, and in front is almost vertical. The greatest height is contained less than four times (.27) in the length, *exclusive of caudal*; that of the caudal peduncle about nine times. The head forms more than three-tenths of the length, while its height bears to its length the proportion of  $22\frac{1}{2} : 31$ . The diameter of the eye equals almost half the height of the head. The preorbital is very narrow. The teeth of the preoperculum are strong and distant, and those of the middle directed obliquely upwards. The sixth dorsal spine equals a ninth of the length. The anus is behind the middle of the length. The caudal rather exceeds the height of the head. The pectoral equals a fifth of the length; the ventral is shorter (.18,) and is inserted *beneath the base of the pectoral*, its spine being at the vertical of the upper axil.

D. vii. 25. A. ii. 22. P. 18.

The color is reddish brown on the head and back, lighter on the sides. A very distinct blackish spot is present above the axilla of the pectoral.

This species is very closely related to *C. chrysope*, but the single individual which is a young one about three inches long, differs from adults of the latter, of which I have seen none less than fifteen inches long, by the greater height of the spinous dorsal and the proportions of the other fins, and the situation of the ventrals, strongly serrated preoperculum, as well as the large eyes and narrow preorbital. The last two characteristics are doubtless those of youth. The value of the others yet remains to be ascertained, but it is probable that they will be found to be specific, although, perhaps, slightly modified with age. The species has been known to me for three years, but I have felt reluctant to describe from so small a specimen. The specimen was obtained by Mr. Xantus at Cape St. Lucas.

*CAULOLATILUS ANOMALUS*.

*Dekaya anomala* Cooper, Proc. California Academy Natural Sciences, vol. iii. p. 71, fig. 17, 1864.

Hab.—Catalina Island, California.

D. viii. 25. A. ii. 25. P. 18.

Sq. 135—140  $\frac{1}{2}$  pm.

*Caulolatilus anomalus* is very closely related to the *C. princeps* of the Galapagos Archipelago, but appears to differ in the more elongated spines of the dorsal fin, as well as the longer pectoral and ventral fins. A critical comparison of fresh or wet specimens of both species is, however, requisite not only to verify the differences referred to, but to ascertain the other differential characters. It is scarcely probable that the two forms are co-specific, but at the same time we must remember that at least one species is common to Lower California and the Galapagos Islands.

The type specimen of *C. anomalus* was kindly forwarded for examination by Dr. Cooper, the discoverer. It is an adult, and belongs to the collection of the Geological Survey of the State of California.

*CAULOLATILUS PRINCEPS*.

*Latilus princeps* Jenyns, Fishes Beagle, 52, pl. 11. *Gthr.*, ii. 253.

Hab.—Galapagos Islands (Chatham Island.)

[April,

On the Cranial Characteristics of *GADUS PROXIMUS* Grd.

BY THEODORE GILL.

While engaged in the investigation of the comparative anatomy of the Gadoids and allied families, my attention was arrested by the very distinctive characters exhibited by the Californian Gadoid named by Girard *Gadus proximus* or *Morrhua proxima*. The title of that form to generic separation from the typical *Gadi*, is fully confirmed. I may remark, that I had long distrusted its pertinence to *Gadus* on account of its small size, but the few and trivial outward peculiarities exhibited by it, almost forbade a separation, until more should be known concerning its organization.

The affinities of the new genus are, perhaps, rather with *Brachygadus* than *Gadus* itself; but the form of the head sufficiently distinguishes it from that type. The distinctive external characters are the angular form of the fins, especially of the first dorsal, the small size and the immaculate body. All the osteological characters, herewith given, are contrasted with those of *Gadus*, and the peculiarities are indicated by the italicized portions.

If, as I suspect, the *Gadus pygmaeus* of Pallas belongs to *Boreogadus*, as restricted by myself, at least three genera of *Gadinae* are represented along the western American coast.

## MICROGADUS GIL.

The cranium is proportionally broader towards the front and less flattened, while the brain case is flattened below, *decidedly swollen* laterally and on each side of a depressed *sphenoidal groove*, and has an ovate cordiform shape. The *paroccipital* or *epiotic* is not produced into an angle behind, but is *obtusely rounded*, and its posterior or *outwardly descending ridge blunt*. The *petrosal* or *opisthotic* is well developed, oblong, and with its re-entering angle *high up*, and, on a line with it, the surface is divided into two parts; an *upper narrow and flattened one*, and a lower expanded one, much swollen; the *alisphenoid* or *pro-otic* is *oblong*, acutely emarginated in front, swollen from the region of the high anterior sinus, and above it little produced forwards. The great *frontal* is little longer than broad, with supraoccipital crest continued only along its posterior *third*, but an anterior low crest *continued forwards* on the bone, and near the front expanded upwards, and with the *expanded portion* behind dividing into narrow *lateral wings*; the lateral tectiform ridges of the frontal are continued forwards and *curved outwards* towards the antero-lateral angles. The anterior frontals are *mostly covered in front* by the great frontal, and are much *developed* in the direction of the *antero-lateral angles*; the inferior expanded axillar portion being very narrow. The nasal has a rounded ridge in front continued well below, and its posterior crest is *laminar and trechant*.

The rest of the bones offer less decided peculiarities, and, therefore, their immediate consideration is less requisite.

*Gadus tomcodus* Mitchill exhibits similar modifications of the cranium, and should be approximated to *G. proximus*.

## Note on several Genera of CYPRINOIDS.

BY THEODORE GILL.

As considerable misapprehension appears to have prevailed regarding several genera of Cyprinoids, established for forms characteristic of the Pacific slope of North America by Girard, due, perhaps, to the vague or erroneous ideas entertained by that gentleman himself, it may be advisable to give the partial results of a renewed examination.

1865.]

The genera *Lavinia*, *Siboma*, *Algansea*, *Tigoma*, *Cheonda*, *Gila*, *Psychochilus* and *Mylochilus*, are closely related to each other, and cannot be distributed among different subfamilies, as has been attempted. Indeed, some of the genera so separated are so intimately allied, that their claims to generic distinction are extremely doubtful. *Siboma* appears to be nearly allied to *Lavinia*, and includes only the *S. crassicauda*, the *S. atraria* belonging rather to *Algansea*. *Algansea* itself and *Tigoma* are scarcely distinguishable, they differing only in the pharyngeal teeth,—*Algansea* having teeth 5—5, increasing upwards, while *Tigoma* has, normally, 2 | 5—5 | 2: both groups have narrow suborbitals. *Cheonda* should be restricted to *C. Cooperi*. The difference between *C. carulea* and species of *Tigoma* are not evident. *Gila* and *Psychochilus* both require revision. *Mylochilus* and *Mylopharodon* do not differ generically, wherefore the former name alone can be retained. The genus *Aerochilus* of Agassiz, referred to *Lavinia* by Girard, has no affinity to that group, being nearly related to *Chondrostoma*, as shown by Agassiz, who has well described its peculiarities, while *Lavinia* as well as *Tigoma*, *Algansea*, &c., are closely related to the European *Leucisci*. As I propose, on another occasion, to give the full generic characters, as well as anatomy of the genera of Western American Cyprinoids, I defer till then further consideration of their affinities.

Observations on the EOCENE LIGNITE FORMATION of the United States.

BY T. A. CONRAD.

OLDER EOCENE OR LONDON CLAY.

*Lignite Epoch.*

Some years ago I visited a marl deposit near Long Branch, Monmouth Co., New Jersey, in which casts of a few shells presented an eocene character. Observing in Vanxem's cabinet a specimen of what is now known to be *Aturia siczac*, I described it in the Journal of the Academy of Natural Sciences, vol. i. 2d series, p. 129, and referred the marl, principally on account of the presence of this shell, to the eocene era. I also described an imperfect cast of the same species as *Nautilus angustatus*, in Dana's Report on the Geology of the Exploring Expedition, which was found at Astoria in Oregon, in company with many shells which I mistook for miocene forms; but a more extended acquaintance with eocene types shows their older tertiary relations, and their matrix to be synchronous with the London Clay of Sheppey, Highgate and Bracklesham. Professor Cook has lately sent me a box of specimens of similar age from Shark River, Monmouth Co., N. Jersey, collected by Dr. Kneiskern. In company with *Aturia siczac* there are imperfect specimens of *Nautilus Lamarckii*, Deshayes, another older eocene form of the Paris basin and of Belgium. Fruits also occur in this bed, referrible to the genera *Nipadites* and *Mimosites*, showing the tropical or semitropical climate of the era, and giving evidence of the intimate relations of the deposit to the Brandon and Mississippi Lignite strata. Indeed, it seems clear that this Shark River marl was the bed of the oldest eocene ocean, and that the flora of the Brandon and Southern tertiary epoch flourished at the same time. The local, circumscribed character of the Brandon Lignite is attributed by Prof. Lesley to its having filled a deep depression, thus escaping the denuding forces which swept all traces of it away over a wide region that it once covered. The locality at Mont Alto, near Chambersburg, described by Prof. Lesley, is doubtless a locally preserved fragment of a vast formation once deposited over the Appalachian slope to the very base of the mountain range, and occupying a large space in South Carolina, Georgia, Alabama and Mississippi, and in fact, extending to the Pacific as far north as Vancouver's Island.

[April,

Dana's map of the cretaceous epoch gives a general view of the United States at this time, supposing what was then ocean had become land and fresh water.

It is probable that the estuary deposits of Upper Missouri are the base of the older eocene, and the fresh-water shells are the earliest tertiary types of this continent. The species of *Vivipara* resemble the eocene forms of the Paris basin. According to Meek and Hayden these beds are more than 2000 feet thick.

Vanuxem was the first geologist who stated that a lignite bed is situated in South Carolina between the cretaceous and eocene strata, and Tuomey has since described several localities in that State and one in Clark Co., Alabama, represented by No. 6 of his Bashia Creek section; and No. 2 of the section represents the Marlborough and Buhrstone group, or second stage of the eocene. In general, some doubt rests upon the identity of species by Tuomey, but the following list of shells contained in No. 2 is copied, with emendations, from his Report: *Ostrea Carolinensis*, Con., *Venericardia planicosta*, *Protocardia Virginiana*? Con., *Volutilithes Tuomeyi*, Con. This bed represents the dark-colored loose sand of Piscataway, over which and next in succession lies the Marlborough rock, which corresponds to the "great Carolinian bed" of Ruffin, and the "calcareous strata of the Charleston basin" of Tuomey. The sand bed and condition of its fossils, as well as the similarity of some of its species, reminds us of the Bracklesham Bay locality in England, and the superimposed rock of the Bognor beds.

Although the *Aturia ziczac* is the only fossil of Oregon known to be identical with the New Jersey eocene, the vast distance between the localities will account for the variation; for the Continent was then as wide as from the Appalachian to the Rocky mountains, and seems to have been intersected by many rivers and fresh-water lakes, which have left an abundance of shells and mammalian remains entombed in the strata deposited by their waters. The Brandon fruits described by Hitchcock are all different from those of Shark River, but the conditions under which they flourished may account for this variation. They probably grew on high land, at some distance from the coast, whilst the station of the others was on low land along the shore, where Palms and Acacias scattered their fruit within reach of currents which swept them into the sea.

At present, the marine beds of this era are found to lie close to the Atlantic, and in Oregon they skirt the shore; but estuary deposits were observed by Meek and Hayden in Upper Missouri. The Shark River marl is an indurated clay, with disseminated grains of green sand, which are often smooth and shining, and the shells are all in the form of casts, which are distorted more or less. Portions of this clay are indurated, making it as difficult to break as the hardest limestone. Its thickness is yet unknown. The *Aturia* of this locality is discoid, which is the result of pressure, whilst the Oregon forms are broader, and one specimen approximates the normal form of the European shell.

Professor Harper describes a deposit on Chickasawhay River, Mississippi, which also is of similar geological age. "The *Nipadites* and *Cycadites* mixed with coniferous trees, and even oaks." "Stumps are seen rooted in the ground, as smooth and even as if not cut with an axe, but sawed with a sharp saw." "A little higher up, on the Chickasawhay River, occurs the most southern outcrop of the large eocene marl-stratum. Above the marl lies a stratum of hard limestone, which contains abundance of an *Ostrea* of large size." In this description I recognize the strata on Savannah River, where the lignite is overlaid by the "great Carolinian limestone" group, and succeeded by the *Ostrea Georgiana*, which is found as far west as Cape St. Lucas in Lower California.

The lignite bed underlies the bluff at Vicksburg, where we find—1. lignite; 2. ferruginous rock, with *Ostrea Georgiana*, Conrad; 3. St. Stephen's lime-1865.]

stone, or Orbitolite limestone, eighty feet; 4. Viaksburg group, with a new species of Orbitolite, — *N. supera*, Conrad.

This formation appears at Cape Sable, near Annapolis, where, at about the water level, "under a stratum of sand, and resting upon an impermeable crust of ferruginous sandstone, lies imbedded in a layer of almost pure alumine, a forest of pine trees, thrown down by some ancient convulsion. The crust which forms the base of this aluminous layer is a little below the level of low tides and is of considerable hardness. The imbedded pines are converted into lignites more or less impregnated with sulphuret of iron. The central parts are generally transformed into pure metallic sulphuret, sometimes exhibiting in the hollow parts octohedral crystals of a yellowish metallic lustre and great hardness. The more remote the ligneous layers from the centre, the less they are saturated with sulphuret of iron. The external rays, as well as the cortical layers, are generally pure lignite, some compact and black, others retaining the color and friability of rotten wood. In some instances their texture seems to have suffered but little alteration: the central system, concentric rays, the bark and knots being perfectly discernible; even fruits are occasionally found in a pretty good state of preservation as to form."\* The lignite is correctly placed in Morton's diagram as overlying the secondary marls. In Morton's paper the first published notice of the formation appeared, drawn up from the notes of Lardner Vanuxem, who was familiar with the strata in South Carolina.

Deshayes states that he has found no species of organic remains common to cretaceous and eocene strata in Europe or Asia, and I have no doubt that the destruction of life was total over the whole surface of the globe at the close of the cretaceous era. Deshayes, indeed, affirms that life has been five times destroyed and renewed in the past history of the earth. When we find evidence of surprising changes of level in the eocene period, the limited nature of a mixed fauna is remarkable, for we would expect to find it much more extensive at the base of the eocene. The bed of the Atlantic along the coast of the United States, from Cape May to the Gulf of Mexico, contains a mixture of recent and miocene shells, which, if elevated above the sea level would present a group of shells consisting of recent and extinct species, so like in preservation that the fossil could not be distinguished from the recent forms, except by one conversant with all the miocene shells.

Deshayes affirms of the Maestrich beds, "that there has been an accidental mixture of cretaceous and eocene; a degradation of a stratum of fossiliferous marl diluted in the bed of the tertiary sea at the time of the first deposit. The bed of the ocean, under our own eyes, shows an accidental mixture of this nature."

The Wilmington rock proves conclusively that this was the case in North Carolina. Eocene and cretaceous fossils are there mingled in a breccia. When I first saw this rock in 1832, no fracture or excavation revealed its true character; but the external resemblance to the Timber Creek limestone of New Jersey, with its corallines, was striking. The mixture of secondary and tertiary species in this breccia, shows that a disturbance occurred in the bed of the eocene ocean, which evidently, from Tuomey's account, extended into South Carolina. No one, I suppose, will tell us that the *Venericardia planicocta* existed in the cretaceous period, yet countless thousands may be observed at the base of the eocene. It is true that in Europe a series of strata, termed Upper and Lower Landenien and Heersien, are said to intervene between the chalk and eocene; but one of the characteristic fossils of the Upper Landenien occurs in the Shark River beds, — the *Cyprisa Morrisii*, of Sowerby. It is therefore probable that the former system is merely an extension of the London Clay. Certainly, in the United States, there is no such system as the

\* Durand, Journ. Phila. College of Pharmacy, v. 12, 1864.



Heersien, whilst Lyell found, in the Belgium Lower Landenien grey marl, a perfect specimen of the *Terebratulina gracilis*,—a well known chalk fossil,—together with *Ostrea (Exogyra) lateralis*, Nyak. Lyell remarks, that the Lower Landenien, at Folx les Caves, rests on the Maestrich chalk.

There is an extensive bed of lignite in Europe of eocene age, which Dehayes says forms a well-determined horizon with the long series of "sables inférieures." "Above the lignite appears a bed of fresh-water and marine shells, the horizon of which I believe to be the same as the lignite formation of the United States. They reveal a singular state of the globe at the commencement of the tertiary period, presenting a vast level region covered by a dense forest, in which palms and oaks grew side by side, interspersed with lakes and rivers and long shallow bays of salt water penetrating to the interior of the continents. This state of the globe was exhibited in Europe and America at the same time, and the land was little elevated above the sea level, except that in America the Appalachians and Rocky mountain ranges stood out from the vast plain.

The Shark River fossils are few in number of species, and generally imperfect casts, with small chalky portions of the shell occasionally remaining. A few of the bivalves have connected valves. About twenty-five species of shells and plants have been collected, of which I think six shells are identical with species of the London Clay and one of the Plastic Clay, *Cyprina Morrisii*.

*Catalogue of Shells of Shark River.*

<i>Mastra</i> ———.	<i>Ataria zicaac</i> , <i>Sowerby</i> .
<i>Cyprina Morrisii</i> .	<i>Nautilus Lamarckii</i> , <i>Desh.</i>
<i>Dione</i> ———.	<i>Priscofusus</i> ———, <i>Con.</i>
<i>Yoldia protexta</i> , <i>C.</i>	<i>Volutilithes mutata</i> , <i>Desh.</i>
<i>Axinea</i>	<i>Surculi annosa</i> , <i>Con.</i>
<i>Crasatella</i>	<i>Sycotopus Smithii</i> , <i>Sowerby</i> .
<i>Venericardia perantiqua</i> <i>Con.</i>	<i>Onnatus extensus</i> , <i>Sowerby</i> .
<i>Avicula annosa</i> , <i>Con.</i>	<i>Hippochrenes columbaria</i> ? <i>Defrance</i> .
<i>Pinna</i> ———.	<i>Asteonema prisca</i> , <i>Con.</i>
<i>Pecten</i> ———.	<i>Architectonica</i> ———.
<i>Ostrea</i> ———.	<i>Pleurotomaria perlata</i> , <i>Con.</i>

*Fish.*

*Cælorhynchus rectus*, *Agassiz*.

**Catalogue of the ECHINER ANNULATA, FORAMINIFERA, ECHINODERMATA and CIRRIPIEDIA of the United States.**

BY T. A. CONRAD.

*Annulata.*

SERPULA, Lin.

- S. ornata*, Lea, Cont. to Geol. 37, 1, 5. Claib.  
*S. squamulosa*, C. J. A. N. S., vii, 149. Claib.

SPIROBIS, Daudin.

- S. tubanella*, Lea, Cont. to Geol. 36, 1, 4. Claib.

DITRUPA, Berkeley.

- D. subcoarctata*, Gabb., J. A. N. S., 2d series, 386, 67, 47. Texas.

*Foraminifera.*

TRILOCULINA, D'Orbigny.

- U. lineata*, C., n. s.

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## CRISTELLARIA, D'Orbigny.

- C. ? rotella, C., Amer. Journ. Science, ii., 2d series, 399, f. 4. Florida.  
*Cristellaria ? rotella*, D'Orbigny, Prodromus, ii. 406, 1300.

## NEMOPHORA, Conrad.

- N. Floridana, (Nummulites) C., Amer. Journ. Sci., ii., 2d series, 399, f. 3. Florida.  
*Cristellaria ? Floridana*, D'Orbigny, Prodromus, ii. 406, 1301.

## ORBITOLITES, Lam.

- O. (Nummulites) Mantelli, Morton, Org. Rem. Cretac. Group, 45, 5, 9. St. Stephens, Ala. S. C., Miss.  
*Orbitoides Mantelli*, D'Orbig., Prodromus, ii. 406.  
 O. supera, C.\* Vicksburg, Miss.

*Echinodermata.*

## ECHINIDÆ.

## SISMONDIA, Desor.

- S. alta, C., Proc. A. N. S., 1865, N. C. Emmons, Geol. N. C., 306, 247, 8.  
 S. crustuloïdes, (Scutella) Morton, Org. Rem. Cretac. Group, 77, 15, 10. S. C. Desor., Synop. des Echin. 227.  
 S. Lyelli, (Scutella) C., Journ. A. N. S., vii. 152, Ala. Desor., Synop. des Echin. 225.  
 S. marginalis, C., Proc. A. N. S., 1865, near Charleston, S. C.  
 S. pileus-sinenais, (Scutella) Ravenel, Proceed. A. N. S. ii. 97. S. C.  
 S. Plana, C. S. C.

## MORTONIA, Desor.

- M. Rogersi, (Scutella) Morton, Org. Rem. Cretac. Group, 77, 13, 3. Alabama. Desor., Syn. des Echin. 231. Clark Co., Ala.  
*Laganum Rogersi*, Agass., Catal. Syst. 6.  
 M. Jonesii, (Scutella) Forbes, Quart. Journ. Geol. Soc., i. 440. Georgia.

## MELLITA, Klein.

- M. Caroliniana, (Scutella), Ravenel, Proc. A. N. S. 1, 81. S. C.

## MACROPHORA, Conrad.

- M. macrophora, (Scutella), Ravenel, Proceed. A. N. S. 1, 81. S. C.  
 M. Ravenelli, C. S. C.

Smaller than the preceding, suborbicular, with an obtusely ovate perforation.

## PYRGORHYNCUS, Agass.

- P. Gouldii, Bouvé, Proc. Bost. Soc. Nat. Hist., ii. 192, and iv. 2. Desor., Synop. des Echin. 299. Georgia.  
*Nuc. Mortoni*, Conrad, Journ. Acad. Nat. Sci., ii. series, 40.

## CÆLOPLEURUS, Agass.

- C. depressus, C., n. s. S. C.  
 C. infulatus (Echinus) Morton, Org. Rem. of Cretac. Group, 75, 10, 7. Desor., Syn. des Echin. 98, S. C.

## CLYPEASTER, Lam.

- C. Jonesii, (Scutella) Forbes, Quart. Journ. Geol., i. 440. Desor., Syn. des Echin. 243. Georgia.

\* Smaller than the preceding and comparatively thicker, without the raised central point. Diameter 13-20 inch. This species is readily distinguished by the convex centre, and is limited to the Oligocene strata.

## ECHINIANTHUS, Breynius.

E. Mortonis, (Pyrgorhyncus) Mich. Rev. et Mag. de Zool., 1850, 2. Desor., Synop. des Echin. 295. Miss.

## CASSIDULUS, Lam.

C. amygdala? Desor., Synop. des Echin. lxxv.

C. Conradi, (Catopygus) Couper, Journ. Acad. Nat. Sci., iv. 2d series, 39, 1, 9. Georgia.

C. Lyelli, (Nuclosolites) Con., Journ. Acad. Nat. Sci., ii. 2d series, 40, 1, 14. Georgia.

C. patelliformis, (Catopygus) Bouvé, Bost. Soc. Nat. Hist., iv. 2. Georgia. *Cassidulus patelliformis*, Desor., Synop. des Echin. 290.

## HERMASTER, Lam.

H. Conradi, Bouvé, Bost., Soc. Nat. Hist., v., 2d series, 3. Georgia. Desor., Synop. des Echin. 373.

## DISCOIDEA, Lam.

D. Haldemani, C., Journ. Acad. Nat. Sci., iv., 2d series, 40, 1, 12. Georgia.

## ECHINOCARDIUM, Gray.

E. orthonotus, (spatangus) C., Proceed. A. N. S. 1, 327. Virg.

*Amphidetus Virginianus*, Forbes, Quart. Journ. Geol. Soc., i. 425.

*Echinocardium Virginianum*, Desor., Synop. des Echin. 408.

## Cirripedia.

## BALANUS, Lín.

B. humilis, C., Amer. Journ. Sci., ii., 2d series, 400, f. 4. Florida.

B. peregrinus, Morton, Organic Rem. of Cretac. Group, 72. S. C.

## Descriptions of new species of ECHINIDÆ.

BY T. A. CONRAD.

## SISMONDIA, Desor.

S. ALTA. Suborbicular; margin thin, disk gradually rising towards the centre and concave in outline; central portion elevated and obliquely flattened at the summit; ambulacra lanceolate, nearly closed; anus subquadrangular, thin, position nearer the mouth than the posterior end; margin thin, undulated.

Scutella, ——— Emmons, Geol. of North Carolina.

S. MARGINALIS. Subovate or suborbicular, depressed; ambulacra lanceolate; central prominence rounded, margin thicker than the submarginal area of the disk; truncated posteriorly, emarginated; anus subquadrangular, minute, situated near the margin, which is thickened beneath. Diameter  $\frac{1}{4}$  inch. Height  $\frac{1}{8}$  inch, S. C.

S. PLANA. Discoid, subovate, very thin, margin slightly thickened, disc convex depressed, summit anterior to the middle; ambulacra broadly lanceolate, nearly closed; anus distant from the margin, but nearer to it than to the mouth. Longitudinal diameter  $\frac{1}{8}$  of an inch; transverse diameter  $\frac{3}{8}$  inch. S. C.

## Descriptions of three new species of Exotic UNIONES.

BY ISAAC LEA.

UNIO WRIGHTII. Testâ plicatâ, latâ, ad umbones inflatâ, valde inæquilaterali, posticè acutè-angulatâ, anticè rotundatâ; valvulis crassiusculis, anticâ crassioribus; natibus subprominentibus et crebrè plicatis; epidermide tene-  
1865.]

broso-fuscatâ, eradiatâ et marginatâ; dentibus cardinalibus sublongis, subobliquis, crenulatis, lamellatis, in utroque valvulo duplicibus; lateralibus prælongis, obliquis, lamellatis corrugatisque; margaritâ albâ et valde iridescente.

*Hab.*—China; A. R. Wright, M. D.

*UNIO TORTUOSUS.* Testâ inæquivalvâ, contortâ, plicatâ, valde obliquâ, infatâ, posticè obtusè angulatâ, anticè obliquè curvatâ; valvulis percrassis, anticè crassioribus; natibus prominentibus, crassis terminalibusque; epidermide tenebroso-olivâ, obsoletè radiatâ; dentibus cardinalibus permagnis, crassis, rectis corrugatisque; lateralibus sublongis, subrectis, striâ perpendiculari instructis; margaritâ argenteâ et valde iridescente.

*Hab.* China; A. R. Wright, M. D.

This remarkable *Unio* is the first which has been found possessing an *irregular plane of the margin and being inæquivalve*. When looking on the anterior end with the ligament above, the line of the opening of the valves curves to the right. The beak of the left valve is higher than that of the right and projects anteriorly. The left valve is therefore larger than that of the right, and the weight differs—the left being 257 grains and the right 242 grains. The very remarkable perpendicular striæ on the lateral teeth of this specimen, if always present in other individuals, will demand its being placed in the genus *Prisodon*, Schumacker = *Castalia*, Lam. These striæ are probably normal to the species. Before *Triguetra contorta*, from China, was described by me, none of us could have expected to see a member of the *Unionidae* to be curved like *Arca tortuosa*, Lin.; but now we have a second member of the family totally unlike the other, except having a curved plane of the shell.

*UNIO RUFOFUSCUS.* Testâ plicatâ, subquadratâ, subsulcatâ, sublenticulari, inæquilaterali, posticè rotundatâ, anticè rotundâ; valvulis crassiusculis, anticè crassioribus; natibus prominulis, crebrè et minutè plicatis; epidermide rufofuscatâ, eradiatâ, micanti; dentibus cardinalibus subcompressis, crenulatis, in utroque valvulo subduplicibus; lateralibus longis subcurvisque; margaritâ albâ et iridescente.

*Hab.*— ? Sig. Patricio Maria Paz.

May 2d.

The President, DR. BRIDGES, in the Chair.

Eleven members present.

The following paper was presented for publication :

"Partial Catalogue of the Cold-blooded Vertebrata of Michigan, Pt. II.," By E. D. Cope.

May 9th.

The President, DR. BRIDGES, in the Chair.

Thirteen members present.

May 16th.

The President, DR. BRIDGES, in the Chair.

Twenty-four members present.

The following paper was presented for publication : "Description of eight new Species of *Unio* of the United States." By Isaac Lea.

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May 28d.

The President, DR. BRIDGES, in the Chair.

Twenty-two members present.

The following paper was presented for publication: "An Examination of Birds of the Genus *Chrysomitris*, &c." By John Cassin.

Dr. Leidy called the attention of the members to specimens of *Gryphæa* and *Ostrea*, from the New Jersey Green-sand, presented this evening, as affording evidence of the existence of a boring sponge, during the Cretaceous period, which penetrated the shells in the same manner as at the present time.

In answer to a question, Dr. Storer stated that he had observed no true viviparous fishes on the Atlantic coast of the United States, but that *Sygnathus* carried its young in an abdominal pouch.

May 30th.

The President, DR. BRIDGES, in the Chair.

Sixteen members present.

The Secretary announced the death, on the 6th inst., of Dr. Wm. Darrach, and on the 13th, of Mr. Fernando de la Cuesta, late members of the Academy.

On report of the respective Committees, the following papers were ordered to be published:

Some Remarks on *LABRUS FULCHER* (Ayres.)

BY ALBERT GÜNTHER, M. A., M. D., PH. D.

The March number of the Proceedings of the Academy of Natural Sciences of Philadelphia, 1864, page 57, contains a paper entitled, "Description of a new Labroid genus allied to *Trochocopus* (Gthr.), by Theodore Gill," in which the author states that he had been misled by me in considering the *Labrus pulcher* (Ayres) as a species of *Semicossyphus* (Gthr.), but having received a specimen of this fish, found "that it has not the 'lateral teeth distinct,' as in *Semicossyphus*, but an 'obtuse osseous ridge round the edge of the jaws without distinct lateral teeth,' as in *Trochocopus* (Gthr.), to which Günther should have referred it." A single glance at pp. 99 and 100 of the fourth volume of my "Catalogue of Fishes," will show that Mr. Gill inverts the characters given by me to those genera. However, his description of the teeth of this fish (p. 58) is distinct enough; and I have no doubt that I should have referred it to *Trochocopus*, if I had seen it.

But a few lines further, the author goes on to say: "I (Mr. Gill) previously followed him, (Dr. G.), as he was acquainted with *Semicossyphus* and *Trochocopus* through autopsy, while I was not." This is not correct, as will be perfectly evident on turning to p. 99 of the volume mentioned, where no reference whatever is made to a specimen contained in our collection, and as is curiously enough acknowledged by Mr. Gill himself on the following page, (p. 59 of his paper), where he says, contradicting himself, that Dr. Günther "was acquainted with neither (viz., *Semicossyphus* and *Trochocopus darwini*) through autopsy."

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## Partial Catalogue of the Cold-blooded VERTEBRATA of Michigan.

BY PROF. E. D. COPE.

## Part II.

(Continued from page 226 of last volume.)

*Malacopterygii.**Fundulus multifasciatus* Cuv., Val. From Frederick, Macomb County, Grosse Isle, and Oakland County.*Fundulus\* aureus*, sp. nov.

Head flattened, its depth at orbit three-fourths interorbital width; latter one-half the length of head, or one-eighth the total length to end of scales at base of caudal. Eye large, its diameter contained once in advance of it, and one and a half times to opercular border. Mouth terminal, mandible slightly longer. Back flat to middle of its length, then rapidly compressed to caudal. Scales large, with no exposed and ten concealed radii, nine longitudinal, thirty-three transverse series. Greatest depth four and three-quarter times in length from end of muzzle to end of scales. Pectorals not reaching ventrals, nor ventrals the vent. Anal originating in advance of dorsal, like the latter, rather short. From base of caudal to anterior base of dorsal equals one-half the length from latter point to end of ossa nasalia. Radii D. 10 C, rounded 16 (complete); 11; V. 6; P. 13. Br. 5. Total length two inches. Above uniform light golden brown; below pale yellow, inferior part of opercula silver white; a brown band extends from the end of the muzzle to the origin of the caudal fin.

From Grosse Isle; obtained by Prof. Fox.

The anterior position of the anal fin allies this to some species which have been separated under the name of *Zygocetes*, for what reason has not yet been explained. A banded species from St. Louis, Mo., has been named *Z. zonatus* by Agassiz, but as there is no description, it has not entered the zoological record.

*Melanura limi* Agass. *Hydrargyra* Kirt.

Flint River, Grosse Isle and Oakland Co.

*Sox typho*, sp. nov.

Profile steeply descending; muzzle slightly concave. Frontal concavity short, strongly marked, as wide as the superciliary plane on each side of it; eye contained six and one-half times in length of head, a little less than frontal width; pupil opposite extremity of maxillary. Latter appressed posteriorly, so as to give a shorter cranial diameter than at the middle of the muzzle. Head contained two and two-fifths times in length to end of caudal. Buccal and opercular scales equal, similar to those on middle of body, smaller than those near anal fin. On body,  $\frac{1}{4}$  110—12. Dorsal region elevated, broad; caudal peduncle thick, its length equal from eye to posterior edge of operculum. Emargination of caudal two-fifths length of the fin. From symphysis mandibuli to anterior margin of orbit 1 in.; from latter point to edge of operculum 1 in. 5 lin.; from last point to origin of ventrals 1 in. 8 lin.; from same

\* *Fundulus sciaenicus*, sp. nov., was brought by Dr. W. A. Hammond from the Nebraska or Platte River, and presented to the Academy. The form is short and stout, the scales large the fins small and the anal originating a little in advance of the dorsal. Length of head  $3\frac{1}{2}$  times to base of tail; eye  $3\frac{1}{2}$  times in length of head, once in front of orbit, and one and two-third times between supercilia. Base of caudal to anterior base of dorsal a little less than half from latter to end of premaxillary. From base of caudal to base of ventrals equal from latter to opposite anterior margin of pupil. Thirteen longitudinal, thirty-nine transverse series of scales. D. prolonged a little beyond anal 10. A. 12. V. 8. Largest specimen two inches in length, many smaller.

Above olive slate color; below, the caudal peduncle and opercula brownish yellow. No spots or lines.

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to origin of anal 3 in. 3 lin.; origin of anal to middle base of caudal 2 in. Total length 10 in. 5 lin.

Above iron brown; numerous closely arranged spots and vertical bars on the lower part of the sides, largest anteriorly, forming a serrate outline to the narrow pale hue of the abdomen. Operculum obliquely barred. A few spots on mandibles below, and a vertical black bar from eye; fins spotless.

No. 64; Waterford, Oakland Co. Several specimens.

The outline, colors and radial formula distinguish this small species from its ally the *umbrosus* of Prof. Kirtland.

The following table represents some of the relations of the species of this genus, as far as deducible from our specimens and the very imperfect descriptions such as authors too frequently inflict upon science.

I. Operculum and cheek entirely scaled.

Branchiostegal R. 11 to 13.

Dorsal outline arched; pectorals much nearer ventrals than end of premaxillary. D. 16. V. 9. A. 14. Depth five times to base of tail. Head  $3\frac{1}{2}$  times in total length. End of upper jaw to orbit much less than from orbit to opercular border. Frontal groove shallow..... *cypho*.

Dorsal outline straighter; pectorals nearer (Dekay) end of muzzle than to ventrals. D. 14—15. V. 9. End of upper jaw to orbit less than from orbit to opercular border. A deep frontal groove. Vomerine teeth in a shorter series than the palatines. *fasciatus*.

Dorsal outline straighter. D. 13. V. 12. A. 12. Head four times in length. (Kirtl.)..... *umbrosus*.

"Similar to *fasciatus*, but D. 12, and the vomerine series longer than palatine," (Holbr.)..... *ravenelii*.

Br. R. 14—16.

Dorsal outline straight; pectoral fin nearer ventral than end of muzzle. D. 18. A. 17. Depth six times to base of caudal. End of muzzle to orbit equal from orbit to opercular border or beyond..... *reticulatus*.

D. 22. A. 21. Probably, not certainly, in this section..... *depronatus*.

*E. crassus*\* Ag. enters this section. Of it little else peculiar is mentioned than that the buccal scales are larger than the opercular, and equal to those on the body, and the front deeply grooved.

*E. affinis* has not been definitely separated from *reticulatus*.

II. Cheek entirely, operculum half, scaled.

Dorsal outline horizontal; pectoral nearer end of muzzle than to ventral. B. 14—15. D. 19. End of muzzle to orbit equal from orbit to border of operculum. Frontal groove deep..... *lucius*.

III. Cheek and operculum half scaled.

B. 19. D. 19. No frontal groove..... *nobilior*.

*Essex*? With the form and proportions of *reticulatus* and the branchiostegal and fin radial formula of *fasciatus*; not far from the *E. affinis* (?) of Holbrook, Ichth. S. Carolina. Grosse Isle, Prof. Fox.

*Esox lucius* L. Richardson.

I find no external specific difference between this fish and the *estor* of Lesueur, Perhaps the large inner palatine teeth are a little longer, and in more numerous rows. The position of the ventral fin, with reference to the anal, caudal and pectoral, varies much in both European and American specimens. Agassiz' description of his *E. borcas* applies very well to specimens of the so-called *estor*; in some of these the vomerine row of teeth is longer, as in type of *borcas*.

\* Am. Journ. Sci. Arts (2) xvi. p. 306.

in others shorter than the palatine. Neither Cuvier nor Richardson could separate American specimens as a distinct species from the European pike.

*Esox nobilior* Thomp.

Hist. Vermont, and Proc. Best. Soc. N. H. 1850, 305, where this is rightly stated to be the *estor* of Richardson. It is also evidently *estor* of Agassiz, Am. Journ. Sci. Arts, xvi. p. 308, and formerly of Kirtland, but later correctly named by the latter, Cleveland Annals of Science, 1854, p. 78; also *E. lucioides*, Agass. and Gir., in Frank Forester, by Herbert. Fine specimens from Saginaw Bay, No. 228. A specimen is in the Academy Museum from the Alleghany River, in Warren Co., Pa., and another was presented by Thaddeus Norris, from Conneaught Lake, Crawford Co., Pa. The head of the latter measures 12 in. 9 l. in length, and 17.6 in circumference at the preopercles.

The *Esox ohioensis* Kirtl., and *lineatus* and *lugubrosus* of Lesueur (C. V. vol. 18) can hardly be said to be described, while the *vermiculatus* of Lesueur, and *vittatus* and *salmonus* of Rafinesque, may be recognized in the localities where first taken, if existing. Lesueur's specimens were taken in the Wabash.

*Trutta namaycush* Penn. Saginaw Bay.

*Thymallus tricolor*, sp. nov.

Muzzle slightly rounded in profile, as long as diameter of orbit; under jaw slightly longer. Cranium rather broad above, median ridge strong to nasal region. Eye just one-fourth length to opercular border. End of maxillary not quite reaching middle of pupil. Nares as near the premaxillary border as to the orbit. Superior angle of interoperculum in contact with operculum; latter twice or more than twice the width of suboperculum. Maxillo-premaxillary angle open, rounded; maxillary little convex; mandible hardly angulated. Head contained in length to base of caudal a little less than five times; greatest depth four and two-thirds in the same. Teeth, including the palatine, well developed; those on the vomer few, in one or two transverse rows. Dorsal, origin opposite median point between ventrals and operculum; length of base equal to from first ray to upper border of preoperculum, or a few lines nearer the orbit; penultimate rays longest, about equal length of head, not quite attaining the base of the anal; R. 21, the first nine undivided. P. 16, extending beyond origin of dorsal; V. 10, under the eighteenth dorsal ray; A. 13; C. 19. Scales extending between longer rays to opposite the edge of the not very deep, rounded emargination. Sc.  $\frac{10}{11}$  95—8, exposed portion little higher than wide. Br. 8. Pyloric coeca twenty-two, (in one specimen), twelve round the pylorus, and ten in two longitudinal parallel rows immediately beyond.

Below silvery, above pale brown, every where with blue reflections. Small deep blue spots scattered on the sides, more abundantly anteriorly. Dorsal fin with numerous blue spots, and two and three rows of narrow pinkish purple spots above them; superior border pink-purple.

Length to base of caudal 8 in. 9 lin.; to vent 6 in. 5 lin. Length of limb of caudal 1 in. 4 lin.; base of anal 10½ lin.

The stomach was filled with neuropterous larvæ and small twigs of Thuja.

This genus, first brought to light in the United States by Prof. Miles, is represented in the more northern parts of the Continent by a fine species—the *T. signifer*—and in Europe by the widely distributed *T. vexillifer*. The present species is intermediate between the two in some respects. The muzzle is shorter, the mouth less angulated, and the eye smaller than in its European congener; the scales are more numerous, and the median frontal ridge is peculiar; the coloration is different. The head is longer than in the *signifer* of Richardson, and the anterior part of the body more produced; the eye is considerably smaller. Dr. Richardson mentions another high northern species, under the name of *Thymalloides*, but little of its distinctive character can be ascertained from his description.

*Coregonus* sp., from Saginaw Bay, indeterminate.

[May,



*Acanthopterygii.*

*Chirostoma sicculum*, sp. nov.

Mandible scarcely longer than premaxillary; mouth extending four-fifths the distance to opposite anterior border of orbit; muzzle conic. Eye  $3\frac{1}{2}$  times in length of head; head five times in length to base of tail. Scales small, in sixteen longitudinal and eighty-five transverse rows. Origin of first dorsal opposite origin of anal, equidistant between base of caudal and anterior border of orbit. Tip of pectoral reaching ventral. Dorsal outline from end of muzzle to end of second dorsal plane. D. V.—12. A. 25. V. 1—5. P. 10. Length to base of caudal

Color in spirits pale brown, (probably translucent in life), the silvery band traversing the 7th row of scales from the dorsal, covering one and two half rows. Top of head, and median dorsal region punctulate with black; opercula silvery.

From Grosse Isle, Detroit River. Prof. Fox.

*Gasterosteus inconstans* Kirtl.\* Grosse Isle. Prof. Fox.

Specimens labelled as having been brought from Sukertoppen, Greenland, by Dr. I. I. Hayes, appear to belong to this species.

*Potamocottus alvordii* Cottus, Girard, Monogr. Cottoids. Smiths. Contr.

Several specimens, agreeing in all points with Girard's description of a young individual except in the position of the vent; the latter is invariably considerably nearer the base of the caudal than to the symphysis mandibuli—most nearly median in the smallest specimens. The largest are  $3\frac{1}{2}$  inches in length. In all I find numerous palatine teeth and a considerable patch of minute dermal spines behind and above the axilla. This species will enter both Girard's *Cottopsis*, and Gill's *Potamocottus*; † but Prof. Gill informs me that he regards the *C. asper* as the only species referable to Girard's genus, and that the others belong truly to *Potamocottus*. Similar spinous scales occur on a

\* *Gasterosteus micropus* is an ally of the *inconstans* brought from the neighborhood of Fort Riley, Kansas, by Dr. W. A. Hammond. It has a much smaller post-pectoral plate and ventral spine, shorter anal and second dorsals, shorter, thicker head, with the bony radii on the upper surface distinct. Length of anal less than from its last ray to end of caudal, and three lengths from the same point reaches the preopercular angle, or hinder margin of orbit. Post-pectoral plate smooth, oblique, concave in front, reaching lower pectoral rays, as long as diameter of orbit longer than smooth ventral spine. Length of muzzle less than diameter of orbit. Belly shield small, twice the ventral spine. Caudal peduncle compressed, smooth. Eye one-fourth length of head; latter is measured three and two-thirds times in length to base of caudal. D. 4, slender, without plates, 1—10; C. 4—10+ truncate; A. 1, 9, first under second of second dorsal. P. 10. Above blackish, below grey; sides, belly and cheeks densely punctulated with black. Near Fort Riley, Kansas; from the Platte River. Dr. W. A. Hammond.

† The Academy's museum possesses a specimen of a Greenland Cottid, which appears to be a second species of the genus *Triglops*. It may be called *T. pleurostictus*, and defined as follows: Head above a line drawn along the suborbital bones, and back above the lateral line covered with minute scales. Eye  $3\frac{1}{2}$  times into head; interorbital breadth less than half orbit, concave; parietal region concave, with a knob on each side. A transverse depression across the line of the posterior nares. Four preopercular spines, two directed backward, one downward and one forward. Mouth horizontal, mandible longer, end of maxillary opposite hinder margin of pupil. On each side, opposite each interval between each dorsal ray, a patch of naked skin imitating a shield; on each side of the fin a row of tubercles extending to middle of second dorsal. Lateral line with ctenoid plates, whose free posterior borders are continuous with the numerous vertical lateral series of small contiguous ctenoid scales; these give an appearance of the existence of the lateral plates seen in some species of *Gasterosteus*; several transverse rows of similar scales in advance of the ventrals. The body from the middle of the second dorsal to caudal is depressed cylindrical. Pectorals extending much beyond vent to anal fin; ventrals reaching vent; latter with a large papilla. Branchiostegal membrane continuous, rays six, (seven in pingellii). Head enters three and three-fourths times in length to base of caudal; greatest depth five times. Rays, D. XI. 2. 4. C. 11 full rays; fin small. A. 27 (24 pingellii) V. L 3 (5 pingellii) P. 18, the rays roughened. Total length 4 in. 9 lin.

General color brown, darkest above; silvery from vent to branchiostegal membrane, and behind and in front of pectoral fin. Sides pale chestnut; a band of sienna streaks from opposite middle of pectoral to base of caudal, interrupted by silver spots and lines.

From Godhaven, Greenland, (Coll. No. 114).

‡ Proc. Bost. Soc. N. H.

specimen from Absecon, N. J., referable to *Octus meridionalis* Gir. My specimens all exhibit a more depressed head than is represented by Girard. They differ from the *wilsonii* in a larger eye and narrow interorbital space, and in their simple pectoral rays; the caudals are twice furcate. Second dorsal has from 16 to 18 rays. They differ from *richardsonii* as described, in having the vent considerably nearer the tip of the caudal fin than the end of the muzzle.

Dexter, Washington Co., No. 183. Grosse Isle, Prof. Fox.

*Urasidea spilota*, sp. nov.

Entering the section with five ventral rays, and with an elongate body; and resembling apparently the *barbii*, except in its short and anteriorly situated ventral fins. In *wilsonii* the eye is smaller, and frontal width greater; the pectoral rays are branched, in the present species simple. In *richardsonii* the vent is said to be the median point of the distance from the muzzle to the caudal fin; here it is much nearer the muzzle. In *cognatus* we are informed that the anal fin has a more posterior position.

The length of the head is contained three times plus one orbital diameter from end of muzzle to base of caudal fin; said diameter enters  $4\frac{1}{2}$  times length of head, and is one-third greater than interorbital width. The head is slightly contracted laterally, and not so depressed as in *T. alvordii*, giving the orbits less vertical range. One preopercular spine. Insertion of pectorals oblique, rays undivided, reaching anus and anterior rays of second dorsal; ventrals below middle of pectoral insertion in advance of dorsal, extending half way to vent. Width of isthmus equal from border of (closed) premaxillary to opposite hinder margin of pupil. Dorsal outline low, regularly descending to near end of second dorsal. Greatest depth enters five times from end of muzzle to base of caudal. Lateral line disappears between middle and end of caudal. First dorsal low, first ray three-fourths of 2d, 3d and 4th; anal begins opposite fourth ray of second dorsal. Caudal fin rather small, rays once divided. No trace of palatine teeth. Rays D. VIII. 17, A. 13, V. I. 4, P. 15, Br. VI. Length three inches.

Above brown, below yellowish, everywhere densely punctulated with darker, except between the vent and anterior to ventral fins. Dorsal, caudal and pectoral fins barred; anal yellowish. Base of caudal and dorsal spots blackish; large lateral round spots of the same color sometimes in seven or fewer cross-bars.

Several specimens from Grand Rapids, on the Grand River, which flows into Lake Michigan.

*Catnotus flabellatus* Put. 329 a. Grosse Isle.

*Peciliichthys coeruleus*\* Agassiz, 329 b. Grosse Isle. This is *P. transversus* Abbott, which name has been accidentally exchanged with the next species; vide the Bull. Mus. Comp. Zool., List of Fishes.

*Hystoma cymatogramma*. *Pileoma cymatogramma* Abbott. Fr. A. N. S., 1860. 329 c. Grosse Isle.

*Percina caprodes* Gir. Patn. 329 d. Grosse Isle. Small specimens, agreeing with *P. Zebra* Ag.

*Stisostedium americanum*\* C. V. *Lucioperca* Auct. Nos. 224, 244, 245, 251, 252, from Saginaw Bay.

*Perca flavescens* Cuv.

63. Oakland Co., 229 Saginaw Bay, (presents a monstrous form of skull,

\* The *E. canadense* of Smith is identified by Agassiz. "Lake Superior" p., with the *americanum*, but it is evident that it is more nearly allied to, if not identical with, the *Esaimonum* Raf., of the Ohio, a handsome and peculiar fish, slightly resembling an *Aspro*, as has been remarked. The latter is not rare, and is well described by Rafinesque in Ichth. Ohioensis.

similar to that figured by Steindachner of Vienna in *Cyprinus carpio*); Pine Lake, etc., etc.

*Roccus chrysopterus* Gill. *Labrax* Auct. No. 246. Saginaw Bay.

*Micropterus nigricans* Gill, MSS. *Huro* C. V. *Grytes* Agass., Lake Superior. Nos. 116 Orchard L. Oakland Co., 122 Strait's Lake do., 317-18-19 Bald Eagle Lake, do., 261 Copenaconic Lake, Grosse Isle.

*Micropterus fasciatus* Gill, MSS. *Cichla* Lesour. *Grytes* Agass. Black Bass of the Lakes and the Ohio. 291, 296, Swartz Creek, Genesee Co. 235, Saginaw Bay. Grosse Isle.

*Pomotis maculatus*\* Gill. *Pomotis vulgaris* Richardson. Fauna Bor. Americana, et Auctorum. Thirty-five spec. No. 56, 58, 59, Waterford, Oakland Co.; 111, Clinton Riv.; 264, Long Lake, Genesee Co., Copenaconic Lake, do., and Grosse Isle.

This species also occurs in the Eastern States and in South Carolina. The dimensions of the largest specimen are: length, 24"; greatest height of body, 10" 5'''.

*Lepomis incolor*† Holbr., Ichth. S. Ca. *Pomotis* C. V. Forty-five spec. Nos. 60, 60a, 61, 265, 258, from same localities as the preceding, and 124, 126, 327, from Strait's Lake, Oakland Co.; 268 near Crooked Lake, Genesee Co.

The identity of this species with that so abundant in the South, is rather unexpected. I find, indeed, an additional anal ray in a few specimens from South Carolina, but no other difference. The largest specimen measures: length, 25" 5''; depth 11". Independent of the difference between this and

\* *Brytus ocellatus* is a pretty species obtained by Dr. J. H. Slack in Lake Whittlesey, Minn. The head is compressed, elongate, contained (measured to just below opercular flap), two and three-fifths or three-quarters to base of caudal; front rather concave, one diameter of the eye reaches to premaxillary border, and five and six measures the length of the head. Mandible not longer when closed; end of maxillary opposite half-way between pupil and edge of orbit. Scales on cheek in

six rows, below suborbital bones; on body — 83-4. Superior posterior border of operculum strong,

rounded, serrate. Dorsal with spines well developed, and no depression between the divisions 10-10; caudal slightly emarginate, +16+; anal projecting beyond second dorsal, 3-9, its first ray opposite the last spinous dorsal. Ventrals quite or barely reaching anal, 1-5; pectorals extending a little further posteriorly, 12. Greatest depth  $2\frac{1}{2}$  times to base of caudal; depth at posterior border of second dorsal one-half depth from first dorsal to origin of ventral; length of caudal peduncle (to line of dorsal) cont. three times from base of caudal to opercular border below flap.

Color in spirits reddish, not punctulate; lower surfaces and fins golden. Second dorsal, anal, and caudal, punctulate, the base of the latter slightly spotted. Opercular flap well developed, outline nearly circular, marked with a black central disc, which is interrupted by the convex border of the operculum, and entirely surrounded by a broad white (? red) border.

The length of this species is about four inches.

† *Lepomis longispinis* of the Mus. Academy was obtained by Dr. Heermann on his journey from St. Louis to Southern California.

It approaches the specimens of Girard, but has a longer head and fins, the spines much more developed, and a larger eye. Front slightly concave; dorsal outline elongate gibbous.

Greatest depth is measured  $2\frac{1}{2}$  times from muzzle to base of caudal. The head measures  $3\frac{1}{2}$  times to the same point; the latter fin  $1\frac{1}{2}$  times in total length. Eye three times from muzzle to suture between operculum and suboperculum; a little longer than length of muzzle, and equal frontal width; maxillary reaching its anterior border. Four rows scales below the orbit. Superior posterior process of operculum distinguishable from the short flap; not serrate; preoperculum finely serrate. Ventrals reaching first anal spine; pectorals a little longer. First soft ray of anal equal base of the fin; third long ray little shorter. Fifth (longest) ray of bony dorsal as long as or longer than half depth of body, measuring to the eleventh row of scales from its base, scales

$\frac{1}{2}$  dl. Caudal not deeply furcate. No trace of palatine teeth. Raddi D. 10-11; O+17+; A. 3-11; V. 1-5; P. 1-12. Length three and one-half inches. General color olivaceous, (possibly stained,) dorsal region, front and base of tail, brown. Belly brighter; an elongate black spot on upper part of operculum, without lighter border, and a round one on the middle of the last rays of the second dorsal.

This is a more elongate species than the *incolor*, which it resembles, has longer fins and fewer rays in the second dorsal. The opercular flap is much smaller.

the preceding species in the pharyngeal teeth, (Pomotis rounded, molar-like; *Ichthelis acuta*, canine, acc. to Holbrook,) they may be distinguished by the anal radii—*maculatus*  $9\frac{1}{2}$ , *incisor*  $10\frac{1}{2}$ , and by the upper posterior process of the operculum having a distinct serrate border in the former, in the latter gradually losing its bony consistence; there are also permanent marks of distinction in the coloration.

*Chaenobryttus\* melanops*. *Ichthelis melanops* Raf. *Ichth. ohioensis*, p. 28. Not *Calliurus melanops* Gir., (*Chaenobryttus* Gill.) U. S. Fac. R. R. x. p. 11.

*Chaenobryttus† gulosus*. *Centrarchus* C. V. *Calliurus* Ag.  
I am indebted to Prof. Gill, of Washington, for the identification of this and some other species of *Centrarchine* genera.

*Ambloplites rupestris* Raf. Gill, Proc. A. N. S., 1860, p. 20. *Centrarchus aeneus* Auct.

302, Algoma, St. Clair Co.; Long Lake; Flint River.

*Hyperistius hexacanthus* Gill, Sillim. Journ., 37, p. 97, 1864. Cuv.  
Val. nec *Centrarchus hexacanthus* Kirtl.  
Saginaw Bay, No. 238.

#### BATRACHIA.

##### GRADIENTIA.

*Necturus maculatus* Bd.

*Amblystoma luridum* Bd.

*Amblystoma fuscum* Hallow.

*Amblystoma punctatum* Bd.

*Amblystoma jeffersonianum* Bd.

*Amblystoma laterale* Hallow.

*Notophthalmus miniatus* Bd.

*Notophthalmus viridescens* Baird.

##### SALIENTIA.

*Chorophilus triseriatus* Wied.

*Acris crepitans* Bd.

*Hyla pickeringii* Lec.

*Hyla versicolor* Lec.

*Rana septentrionalis* Bd.

\* Vjd. Gill, in Sillim. Journ., 1864. 37—p. 94.

† An allied species was contained in a fine collection of fishes made in Minnesota by J. H. Slack, M. D., and presented to the Academy by him. It may be thus distinguished:

*Bryttus minneopas* sp. nov. End of maxillary opposite posterior margin of pupil; eye  $1\frac{1}{2}$  to twice in frontal breadth, five and a half to six times from end of snout to upper posterior border of opercular bone. Greatest depth  $2\frac{3}{4}$  to  $2\frac{1}{2}$  times in length to base of caudal. Length of head to upper border suboperculum a little over three times in length to base of caudal. Opercular flap a mere border above, little prolonged, but wider opposite the superior angle of suboperculum. Spinous rays of dorsal very short; angles of caudal slightly rounded, the emargination shallow, its length entering  $5\frac{1}{4}$  in the total. Anal not reaching caudal, and prolonged beyond second dorsal. The ventrals originate a little anterior to the first dorsal, and do not reach the anus; are two-thirds their length from anal; pectorals not extending beyond them. Preopercular angle finely denticulate. Scales  $\frac{8}{20}$  48; ten series on the cheek below orbit. Rays, D. X 11; C. +17 X;

A. III 9; V. 15; P. 12.

Color in alcohol light-reddish, shaded above with brown, below with yellow; a black spot at posterior base of second dorsal, the fin otherwise immaculate, sometimes dark shaded. Anal shaded dusky, bordered with white; ventrals dusky. Opercular spot large, oval, bordered with light narrowly above, more broadly inferiorly. No stripes on the head.  
Specimens obtained at Minneope, Minnesota.

[May,

*Rana clamitans* Daud.

*Rana silvatica* Lec.

*Rana halecina*, Kalm.

*Rana catesbyana* Shaw.

The seventy-eight species embraced in the above synopsis form but part of the fine zoological collection made by the State Geological Survey, under Prof. Alexander Winchell.

*Note on the Fishes brought from the Platte River, near Fort Riley, by Dr. Wm. A. Hammond.*

*Bryttus longulus* Gird., U. S. Pac. R. R. Rept., x. p. 16.

*Stizostedion americanum* C. V., Dekay, Zool. New York.

*Poeciliichthys mesaeus* Cope, Pr. A. N. S. Phil., 1864, p. 232.

*Gasterosteus micropus* Cope, supra.

*Trutta lewisi* Gird., U. S. Pac. R. R. Rept., x. p. 318.

*Hyodon tergisus* Les., Gird. l. c., p. 332.

*Percopsis hammondii* Gill, Proc. A. N. S. Phila., 1864, p.

*Fundulus sciadicus* Cope, supra.

*Carploides damalis* Gird., loc. cit., p. 218.

*Catostomus chloropterus* Abbott, Proc. A. N. S. Phila., 1861, 473.

*Campostoma hippops* Cope, Pr. A. N. S. Phila., 1864, p. 264.

*Hybognathus evansi* Gird., loc. cit., x. p. 236.

*Pimephales promelas* Raf., Ichth. ohioensis, p. 53.

*Alburnus\* oligaspis* Cope, Pr. A. N. S. Phila., 1864, 282.

*Gila affinis* Abb. l. c., 1861, p. 474.

*Semotilus corporalis* Mitch., Putn. *Sem. hammondii* Abb., l. c. p. 474.

*Semotilus pallidus* Gird., loc. cit., x. p. 251.

*Platygobio gulonellus* Cope, l. c., 1864, p. 277.

*Ceratichthys cyclotis* Cope, Pr. A. N. S. 1864, p. 277.

*Rhinichthys maxillosus* Cope, loc. cit., 278.

*Ictalurus cærulescens* Raf. *Pimelodus hammondii* Abbott, Pr. A. N. S. Phila., 1861, 569, appears to be same as that named by Rafinesque *pallidus marginatus*.

\* A species of this genus occurs in some of the tributaries of the Allegheny, e. g., the Kiskiminnitas, which differs from those hitherto described. The head is elongate conic and compressed, the outline of the vertex and front nearly plane, scarcely descending at the end of the muzzle; length one-fifth the total, (thus differing from *dilectus* Gir. one-sixth). Operculum a little higher than long. Mouth elongate, very oblique, end of maxillary opposite anterior margin of orbit; border of pre-maxillary above opposite middle of pupil, (differing in this from *rubellus* Ag.) Orbit nearer end of muzzle than to opercular border, its diameter not reaching former, and contained four times in length of head. Shape regularly fusiform, greatest depth five and one half times in length including caudal. Scales  $\frac{1}{2}$  39+3, fewer than in *umbratilis*, more than in *oligaspis*, and much as in *amabilis*, *megalops* and *scelus*. These species are not so elongate, have differently proportioned heads and different coloration. The lateral line has a long slight deflection as far as the dorsal fin. The pectorals do not reach the ventrals, which originate anterior to the dorsal, and do not extend to the anal. Base of anal more elongate than in *rubellus*, equal depth of body at its fourth ray. D. I. S. C. +19+. A. 2, 10. V. 8, P. 11, the four upper rays enlarged in the spring, as in *Rhinichthys*, etc. From origin of caudal to that of dorsal equal from latter to posterior border or middle of orbit. Length 2 in. 6 lin.

Above yellowish olive, the scales with punctulate margins; a median dorsal line. A dark lateral band has a distinct outline on the third row of scales above the lateral line, but vanishes in punctulations below; it is broader and more distinct on the caudal peduncle. From its superior border a silver reflection extends over the white abdomen. Sides of head silvery; chin, muzzle, lips, front and vertex light vermilion during the breeding season. The bases of the fins, except the caudal, are similarly colored at this season. The pharyngeal teeth are but little hooked; in three specimens, 4. 2-1. 4, and in two, 4. 2-2. 4.

I have called this species *Alburnus rubrifrons*. Its form is quite different from that of the *A. nitidus* Kirtland; the latter resembles more the *Hybognathus proceus*.

1865.]

*Ictalurus notatus* Abb., loc. cit.

*Amia calva* Linn.

*Lepidosteus otarius*, sp. nov.

Distinguished from the other species of the genus contained in the Mus. Academy, as below.

A complete series of adult and young specimens of *Lep. huronensis*, from the Alleghany River and the Lakes, shows but a limited variation in the relations of the diameter of the eye, operculum, cheek, and frontal width. The Texan specimen included in the list below, may be the *leptorhynchus* Gird., but that species is not recognizable from the description, Pac. R. R. Rept., x. 351. I have seen no individuals assignable to the *gracilis*\* Agass., Fauna Bor. Americ., Richardson., iii. p. 240.

I. Horizontal diameter of the eye more than half the distance from its border to the operculum.

a. Distance from pectoral to ventral fins considerably less than from ventrals to anal.

Anterior border of operculum longer than horizontal diameter of the same; its inferior border straight. Eye one and three-fourths to twice in frontal breadth. Scales smooth, 43—4, in a ring passing behind ventrals. From ventral to anal three and a half to three and three-fifths times in length from muzzle to inferior origin of caudal. Fourteen specimens..... *huronensis*.

Operculum also higher than long, its lower border descending anteriorly. Eye one-third of frontal width; 44 rows of scales, as above, 57 on lateral line; many on anterior third of body rugose radiate. One spec..... *crassus*.†

\* *Cylindrosteus productus* was brought by Dr. A. L. Heermann in a valuable collection made in Texas, for the most part near San Antonio, his place of residence. It approaches nearer the true *Lepidosteus* than any of the flat-billed species yet known: the bill is considerably more elongate than in the *platystomus*, and the opercula more posterior. Length of head enters total length (including caudal) three and a half times in the former, four times in latter. Width of muzzle at middle enters nine and one-half times the length of the head, above. Frontal breadth five and one-half times in length of head above in *productus*, four and one-half in *platystomus*. Orbit contained three times in distance from its posterior border to operculum, and twice in frontal width. Four scales border the occipital plates, and the line connecting the opercular borders cuts the hinder edge of the third row. Parietal plates presenting each a prominent angle forwards, near the median suture: radii of upper surfaces of head but little broken into granules. Scales perfectly smooth, with entire borders straight posterior to ventrals, anterior without sigmoid curve. Plates of vertebral series each broader than long, anterior to ventrals. Forty-one scales posterior, forty-three anterior to ventrals in an armulus. Anterior border of operculum longer than the greatest length of the same. D. 8; C. 11; A. 7; P. 10. End of muzzle to pectoral 5 in.; pectoral to ventral 4 in., 3 l. Ventral to anal 4 in., 5 lin.; to caudal below 6 in., 6 lin. Above light lead-colored; sides of body and head silvery, former densely punctulated; latter with a series of spots on the jaws. Muzzle above with eight cross-bands to angle of mouth; three across top of cranium. Below yellow, many scales (in a stuffed specimen,) spotted and shaded with pink.

The species *latirostris*, *oculatus*, and *albus* have the muzzle broader than, or similar to, that of the *platystomus*.

† This is a stout, thick species, with broad head, and not very elongate muzzle. Breadth just anterior to opercula, three and a half times in total length of head from occipital shields: the latter enters length to origin of caudal three and one-twelfth times. The front is slightly convex, and descends strongly. The circumference of the body in front of the ventral fins is one-half the length from the middle of the origin of the tail to the anterior border of the orbit. Four or five rows of scales on the anterior third of the length are radiate grooved. End of the longest dorsal ray above the first pair of braces of the lower caudal ray. Behind the ventrals, about eleven rows of scales that are longer than high on each side of the median line. Rays D. 8; C. 12; A. 9; V. 6; P. 12. Above plumbeous, the scales with paler centres; below straw-color; several large dark spots and shades on the sides, from the caudal fin to near the ventrals: all the fins spotted. Length from end of muzzle to base of caudal, 2 ft., 11 in.; to origin of anal, 2 ft., 5 in.; to ventrals, 1 ft., 7½ in.; to opercular border, 11 in., 5 lin.; to anterior margin of orbit, 8 in. Length of pectoral fin, 2 in., 6 lin.; of ventral, 3 in., 2 lin.; of anal, 3 in.

The type specimen was probably taken in brackish water at Bombay Hook, near the mouth of the Delaware River.

[May,

ad. Distance from pectoral to ventral equal to or greater than from ventral to anal.

Operculum higher than long. From ventral to anal four times from muzzle to lower origin of caudal; head two and three-fourths times in length to same point: 43—4 rows of scales in ring: 57 in lateral line: faint traces of radii on a few anterior rows. One spec..... *longirostris*.

Operculum longer than high. Scales smooth, in 41 rows in ring behind ventrals; lat. lin. 61—3. Head three and one-sixth in length to inferior base of caudal. Eye one and two-thirds in frontal breadth. Generally as in *huronensis*. Three spec..... *otarius*.

II. Horizontal diam. of eye contained more than twice, from its post. bord. to operculum.

a. Scales smooth.

Eye 2½ in front; lat. line 58; pect. fin 13 rays.....sp. from Texas.

Eye 3½ in front; lat. line 64; pect. fin 11 rays. One spec. *oxyurus*.

aa. Scales on anterior half or more of body crenate and somewhat radiate and tuberculate.

Head three times from end of muzzle to lower origin of caudal; from ventral to pectoral a little less than from v. to anal. Opercular anterior suture longer than length of operculum. Eye three and two-thirds to three and five-sixths in frontal breadth. Scales 47 to 50 in ring behind ventrals, and 56 in lateral line. Two specimens..... *ossesus*.

In the *L. otarius* the temporal breadth is contained more than five times in the total length of the head. D. 8, A. 9, P. 12. The borders of the scales are hirsute, as in *huronensis*, and the shorter straight, behind the line of the ventral fins, except a few toward the dorsal region. The first row in front of the dorsal is the third from the inferior origin of the caudal, and fifth from the anal. The parietal membrane shields present each a principal angle anteriorly near the median line; five scales bound the occipitals posteriorly. From end of muzzle to anterior border of orbit 5 in., 6 lin.; to anterior border of operculum 7 in., 10 lin.; to posterior edge of do., 8 in., 8 lin.; to origin of ventrals, 15 in.; to inferior origin of caudal, 24 in., 9 lin. Lead-colored above; the sides silvery; below white. Pectoral and ventral fins unspotted; the others spotted: the anal sparsely; a black spot at base of caudal.

Number of species obtained by Dr. Hammond, 23; in the Michigan synopsis, 63; species occurring in both, *Amia*, *Hyodon*, *Stizostedion americanum*, *Ceratichthys*, *Pimephales promelas*, and *Semotilus corporalis*. In the following list is shown the number of species of the synopsis as yet known to occur in the Ohio and tributaries, the Susquehanna, and the Delaware:

	Michigan.	Ohio.	Susquehanna.	Delaware.
Ganoidel.....	3	2	0	0
Nematognathl.....	4*	3	1	1
Eventognathi.....	28	10	6	4
Malacopterygii.....	7	73	1	1
Acanthopterygii.....	19	12	75	73

*Supplementary Note on a peculiar genus of CYPRINIDÆ.*

I obtained a small fish in the Kiskiminitas River, Western Pennsylvania, the present spring, which appears to be related in structure to allied genera of the Cyprinidæ, as *Acerina* is to some others among Percidæ. Its gene-

\* *Ameurus deka yi* must be added to the Catalogue pt. I., and the supposed *Ictalurus gracilis* is the *coeruleus*.

ral appearance is that of a small *Gobio* or a *Hypognathus*, with the muzzle rather heavier than is usual in either; but examination shows that, besides the absence of barbels, it is peculiar in that the suborbital and interopercular bones, with the rami of the mandible, are greatly dilated, and bear septary laminae, which separate mucous cavities, relatively as large as those of *Acerina* or *Percopsis*. They extend in two series; seven from the postorbital bone to the side of the end of the muzzle, and eight from the same point to the symphysis mandibuli. The muzzle overlaps the mandible; no cartilage on the latter. Scales large, the usual surface exposed. Anal short, originating opposite end of depressed dorsal. Origin of ventrals opposite first dorsal ray. Pharyngeal bones slender; teeth acutely uncinately-raptatory, without masticatory surface, 4.1—0.4.

I am not aware that any genus of Cyprinidae is known to exist in America or the old world, which possesses the cavernous structure above mentioned. Traces of it may be observed on the interoperculum in certain genera, e. g., *Hypsilepis*.

The suboperculum is small; operculum height to breadth as one and one-half to one. Head broad, muzzle obtusely rounded. Canthus of mouth opposite nares. Length of head contained three and five-sixths times to origin of caudal; greatest depth (at dorsal) nearly five times in the same. Caudal peduncle elongate, not constricted. Eye large, contained a little more than three times in length of head, a little more than frontal width. Origin of dorsal a little in advance of the point midway between end of muzzle and origin of caudal, its anterior ray equals half the distance from its base to anterior nostril. Caudal furcate one-half its length. Ventrals barely reaching vent; pectorals attaining ventrals. Scales  $\frac{1}{2}$  33; exposed portion with very numerous and delicate radii and concentric lines, not visible to the naked eye. A narrow space from vent to opposite middle of pectorals scaleless. Fins, DI. 8. C. +17+. A. I. 8. V. 8. P. 12. Lateral line nearly straight. Along and above it is a lateral band of brown punctulations; general color above yellowish olive, the edges of the scales dark-shaded, and a narrow brown vertebral line from nape to tail. Below lateral line silvery. Dorsal and caudal fins rosy. Length from muzzle to opercular edge 7 l.; to dorsal fin 13 l.; to end of appressed anal 1 in. 9 l.; to origin of caudal 2 in. 2 l.; to end of caudal 2 in. 8 l.

This species appears not to have come under the notice of Prof. Kirtland or of Rafinesque. It may be called *Erieymba buccata*.

#### Descriptions of Eight new species of UNIO of the United States.

BY ISAAC LEA.

*UNIO DOLIARIS*.—Testâ lævi, ellipticâ, valdè inflatâ, inæquilaterali, posticè obtusè angulatâ, anticè rotundatâ; valvulis subtenuibus, anticè crassioribus; natibus prominentibus, valdè inflatus; epidermide virido-luteâ, radiis undique indutis; dentibus cardinalibus erectis, acuminatis, compresso-conicis crenulatisque; lateralibus sublongis, curvatis corrugatisque; margaritâ albâ et valdè iridescente.

*Hab.*—Etowah River, Georgia. Rev. G. White.

*UNIO PROTENSUS*.—Testâ lævi, latè ellipticâ, subcompressâ, valdè inæquilaterali, posticè subbiangulatâ, anticè rotundâ; valvulis subtenuibus, anticè aliquantò crassioribus; natibus prominulis; epidermide tenebroso-fuscâ, obsoletè radiatâ; dentibus cardinalibus minimis, obliquis striatisque; lateralibus prælongis subcurvisque; margaritâ vel cæruleo-albâ vel salmoniâ et iridescente.

*Hab.*—North Carolina. Prof. E. Emmons.

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**UNIO PUNCTATUS.**—Testâ lævi, ellipticâ, ad latere planulatâ, valdè inæquilaterali, posticè et anticè rotundatâ; valvulis crassis, anticè aliquantò crassioribus; natibus vix prominulis; epidermide olivaceâ; radiis punctatis undiquè indutis; dentibus cardinalibus parvis, compresso-conicis crenulatisque; lateralibus longis, crassis subcurvisque; margaritâ argenteâ et iridescente.

*Hab.*—Caney Fork, Tennessee, Dr. Edgar; and Tuscumbia, Alabama, B. Pybas.

**UNIO AMABILIS.**—Testâ lævi, triangulari, subinflatâ, inæquilaterali, posticè angulatâ, anticè rotundâ, valvulis crassiusculis, anticè crassioribus; natibus subprominentibus, ad apices undulatis; epidermide vel luteolâ vel fuscescente, obsolete radiatâ; dentibus cardinalibus parvis, obliquis corrugatisque; lateralibus sublongis, obliquis corrugatisque; margaritâ vel albâ vel dilutè salmoniâ et valdè iridescente.

*Hab.*—Butler, Taylor Co., Georgia. H. M. Neisler.

**UNIO LYONII.**—Testâ lævi, subrotundâ, subcompressâ, inæquilaterali; valvulis subcrassis, anticè crassioribus; natibus prominentibus; epidermide rufo-fuscâ, latè radiatâ; dentibus cardinalibus subgrandibus, subcompressis corrugatisque; lateralibus crassis, obliquis subcurvisque; margaritâ dilutè salmoniâ et valdè iridescente.

*Hab.*—East Tennessee. Major S. S. Lyon, U. S. E.

**UNIO PROPRIUS.**—Testâ lævi, oblongâ, subinflatâ, inæquilaterali, posticè obtusè angulatâ, anticè rotundâ; valvulis subtenuibus, anticè crassioribus; natibus prominulis, ad apices undulatis; epidermide luteâ, eradiatâ; dentibus cardinalibus parvis, acuminatis, erectis, compressis; lateralibus sublongis subcurvisque; margaritâ vel purpureâ vel salmonis colore tinctâ et iridescente.

*Hab.*—Lafayette, Georgia. Rev. G. White.

**UNIO CROMWELLI.**—Testâ lævi, ellipticâ, subinflatâ, valdè inæquilaterali, posticè rotundatâ, anticè rotundâ; valvulis subtenuibus, anticè crassiusculis; natibus subprominentibus, ad apices concentricis plicatis; epidermide minutè striatâ, fuscâ vel virenti, radiatâ; dentibus cardinalibus parvis, compressis, corrugatis, in utroque valvulis duplicibus; lateralibus sublongis subcurvisque; margaritâ purpurescente et valdè iridescente.

*Hab.*—Kiokee Creek, near Albany, Dougherty Co., Georgia. B. M. Cromwell, M. D.

**UNIO MARGINIS.**—Testâ ellipticâ, inflatâ, valdè inæquilaterali, posticè et anticè rotundatâ; valvulis crassiusculis, anticè crassioribus; natibus subprominentibus; epidermide striatâ, fuscâ, marginatâ, obsolete radiatâ, dentibus cardinalibus parvisculis, valdè crenulatis; lateralibus subcurvisque; margaritâ albâ et valdè iridescente.

*Hab.*—Blue Springs, Dougherty Co., Georgia. Bishop Elliott.

**An Examination of the Birds of the genus CHRYSOMITRIS, in the Museum of the Academy of Natural Sciences of Philadelphia.**

BY JOHN CASSIN.

Genus CHRYSOMITRIS, Boie.

(Genus Chrysomitris, Boie, Isis, 1828, p. 322.)

1. *Chrysomitris*.

1. *CHRYSOMITRIS SPINUS*, (Linnæus.)

*Fringilla spinus*, Linn., Syst. Nat., i. p. 181, (1758.)

Pl. Enl. 485. Gould, B. of Eur., pl. 197. Naum., B. of Germ., pl. 125.

1865.]

Numerous specimens from Europe. Two specimens, male and female, seem to be smaller, and may be *C. pistacia*, Bonap., Consp. Av., i. p. 515. They are in adult plumage, and are quite identical with *C. spinus* in all characters except size, and a slightly greater elongation of the bill. Though evidently the preparations of one collector, these two specimens bear no reliable label indicating locality.

2. *CHRYSOMITRIS SPINESCENS*, Bonaparte.

*Chrysomitris spinescens*, Bonap., Consp. Av., i. p. 517, (1850.)  
"Fringilla spinescens, Licht., Mus. Berol." Bonap. ut supra.

Several specimens, labelled South America. Of all of the birds of this group, this species is most nearly related to *C. spinus* of Europe, and in the greatest degree resembles it in colors. It is sufficiently described in *Conspectus Avium*, as above cited, and can be distinguished readily from any other species, though resembling in colors *C. Yarrellii*, (Aud.) The latter is smaller, with the bill larger, and having the yellow parts of the plumage clearer, or less tinged with green.

3. *CHRYSOMITRIS BARBATA*, (Molina.)

*Fringilla barbata*, Mol., Sagg. Stor. Nat. Chili, (1782), 2d ed., p. 209, (1810.)  
*Carduelis Stanleyi*, Aud., Syn. B. of N. A., p. 118, (1839.)  
*Chrysomitris marginalis*, Bonap., Consp. Av., i. p. 517, (1850.)  
*Chrysomitris campestris*, Gay, Hist. Chili, (not of Spix, Av. Bras.)  
*Crithagra flavospectularis*, Hartl. Naum., 1853, p. 213.

Aud., B. of Am., oct. ed., iii. pl. 185. Gilliss' Astronom. Exp. Chili, ii. pl. 17.

Specimens from Chili in the Academy Museum and in the National Museum; and, through the kindness of Professor Baird, I have also before me the original specimen of *C. Stanleyi*, Audubon, described and figured by that author as above. The last is either a young male or female, and has the general appearance of specimens collected and prepared by the late Dr. Townsend, several of which Audubon erroneously described as from California. A specimen of the same species, in much more mature plumage, is in the Academy Museum, from Dr. Townsend's collection, and is labelled in his handwriting, "Valpo. Chili, ♂, J. K. Townsend." The specimens from Chili in the Academy, and those of Townsend and Audubon, are quite identical, and entitled to all the names above specified.

The colors of this species are not fairly represented in Audubon's plate, above referred to, though sufficiently accurate for the recognition of the female, or of the male in imperfect plumage. The plate in Gilliss' Rept. is better, though the transverse band on the wing is unusually pale, and is generally yellow. The description by me in the same volume, (as cited above, p. 181.) is correct. Though having the black cap and black throat and general colors of the typical *C. spinus*, the bill in the present bird is much thicker, and the general organization more robust. The affinities of this species are, however, clearly in this group, but it is not so nearly related to *Carduelis spinoides*, Vigors, of India, as to be properly included in the same genus, which Dr. Cabanis considers probable (Mus. Hein., i. p. 161). That species, *C. spinoides*, is quite properly separated from *Chrysomitris* by that excellent and distinguished ornithologist, and is the type of his genus *Hypacanthis*, though in my opinion not fully entitled to generic distinction. Its relations are, I think, to the group *Chlorospiza*, Bonaparte, and especially to the species *C. kawariba*, *C. sinica*, and perhaps others.

Specimens of this species, from the collection made in Chili by Gilliss' Expedition, have the transverse band on the wing nearly white, as represented in the plate cited above. In all other respects they are identical with others in a collection made in Peru and Chili, and presented by the Hon. John Raulolph Clay, late Minister of the United States to the former country. They

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are identical, also, as stated above, with the types of Audubon's *C. Stanleyi*, which were undoubtedly collected at Valparaiso, Chili, by Dr. Townsend.

4. *CHRYSONITRIS PINUS*, (Wilson.)

*Fringilla pinus*, Wils. Am. Orn., ii. p. 133, (1810.)  
Wils. Am. Orn., ii. pl. 17. Aud. B. of Am., pl. 180. Oct. ed., iii. pl. 180.

Numerous specimens from various localities in North America, but presenting no important differences. This species shows in colors but little similarity or near relationship with any other of this group. It is well known, and a favorite with collectors in the Middle States of this Republic, as one of the specialties of winter shooting, and is best known in its winter plumage. The summer plumage *ought* to differ materially, judging from the seasonal changes that take place in *C. tristis* and other species of this group. Specimens from Orizaba, Mexico, in the collection of the Smithsonian Institution, seem to be identical with others from the United States, and I fail to discover in any of them the characters of *C. macroptera*, Du Bus.

2. *Pyrrhomitris*.

5. *CHRYSONITRIS CUCULLATA*, (Swainson.)

*Carduelis cucullata*, Swains., Zool. Ill., i. p. (not paged, 1820.)  
*Fringilla Cubæ*, Gerv., Mag. Zool., 1835, p. (not paged.)  
Swains. Zool. Ill., i. pl. 7. Mag. Zool., 1835, pl. 44.

Numerous specimens of both sexes, labelled "Trinidad," and, in one instance, "Cayenne;" and also one specimen in a collection made by Mr. Geo. Robbins, in Venezuela. The last, though in nearly mature plumage, is remarkable for having the transverse band on the wing dull yellow, instead of the usual pale red, and is the only instance of that description of variation that I have seen in this species.

3. *Melanomitris*.

6. *CHRYSONITRIS ATRATA*, (D'Orbigny et Lafresnaye.)

*Carduelis atrata*, D'Orb. et Lafres., Mag. Zool., 1837, p. 83.  
D'Orb., Voy. Am. Mer. Ois., pl. 48, fig. 2.

One specimen in adult plumage, from Verreaux, and another not mature, from D'Orbigny's collection. The former is almost precisely as given in the figure of D'Orbigny, as cited, but his description is different, and more like the present specimen from his collection, having the under parts from the breast mixed with pale yellow feathers. He says in his description in Voy. Amer. Mer. Ois., p. 364: "*subtus tota flava, gutturo, collo, pectore hypochondriis-que fusco striatis.*" The description in Mag. Zool., as above cited, is different, and applies strictly to the adult bird.

7. *CHRYSONITRIS UROPYGALIS*, Sclater.

*Chrysonitris uropygialis*, Sclat., Cat. Am. B., p. 125, (1862.)

Easily distinguished from the preceding by its yellow rump, and by having the entire under parts of the body and under wing coverts yellow. Specimens from Gilliss' Exp. to Chili, now in the National Museum in charge of the Smithsonian Institution, were mistaken by me for the preceding, (*C. atrata*), having at that time only the young specimen from D'Orbigny's collection, to which I above allude, and relying on it for my determination of the species.

8. *CHRYSONITRIS BRYANTII*, nobis.

Resembling both of the preceding, but smaller, and with the entire upper parts, including the rump, clear lustrous black in the male, and with the head also black. Under parts of body, under wing coverts, and under tail  
1865.]

coverts, yellow. Wing with a large transverse band of yellow, not including the first quill, and not extending longitudinally on the quills, but abruptly defined, (differing in that respect from both *C. atrata* and *C. uropygialis*.) Quills externally (in the male,) clear lustrous black, without paler margins, internally edged with pale yellow, forming a large spot of that color on the inferior surface of the wing. Sides of body mixed with black feathers. Tail black, all the feathers, except the two in the middle, with their bases yellow. Bill and feet bluish black, under mandible lighter at base.

Female. Entire upper parts, including the head above, dark green, under parts greenish yellow, middle of abdomen and under tail coverts yellowish white. Wing brownish black, with a large transverse band of yellow, restricted, as in the male; tail brownish black, yellow at base.

Total length  $4\frac{1}{2}$  to  $4\frac{1}{2}$  inches, wing  $2\frac{1}{2}$  to  $2\frac{1}{2}$ , tail  $1\frac{1}{2}$  to  $1\frac{1}{2}$  inches, "extent of wings  $6\frac{1}{2}$  inches."

Hab. Dota, Costa Rica. Discovered by Mr. Julian Carmiol. Spec. in Museum of the Smithsonian Institution.

This handsome little species is allied to *C. atrata* and *C. uropygialis*, and of the same general colors, but is much smaller than either, being little larger than *C. mexicana* and *C. columbiana*. It is easily distinguished by having the entire head and upper parts uniform lustrous black, and the under parts yellow. The large yellow spots on the wings are restricted, and do not extend longitudinally along the primary quills, as in the preceding and other species.

This interesting little bird is dedicated to my friend Henry Bryant, M. D., of Boston, Mass., as a slight token of my respect for his many accomplishments as a gentleman and naturalist, and in pleasant remembrance of years of uninterrupted friendship.

#### 4. *Sporagra*.

##### 9. *CHRYSOMITRIS MACELLANICA*, (Vieillot.)

*Fringilla magellanica*, Vieill., Nouv. Dict., xii. p. 168, (1817.)

*Fringilla icterica*, Licht. Verz., p. 26, (1823.)

*Fringilla campestris*, Spix, Av. Bras., ii. p. 48, (1825.)

Vieill., Ois. Chant., pl. 30. Aud., B. of Am., pl. 394. Oct. ed., iii. pl. 182.

Numerous specimens from South America, in which there is not so much uniformity of specific characters as is desirable, though I find myself unable to trace sufficient regularity for distinction or separation. In specimens from Southern Brazil the black of the head seems to be more restricted, and extends but slightly on the neck in front, and the light edgings of the quills and wing coverts are nearly obsolete. This appears to be the species figured by Audubon as above, and stated by him to have been obtained in Kentucky.

##### 10. *CHRYSOMITRIS NOTATA*, (Du Bus.)

*Carduelis notata*, Du Bus., Bull. Acad. Bruss., 1847, p. 106.

Numerous specimens from Mexico. Resembling the preceding, (*C. magellanica*,) but easily distinguished by its deep black wings, without paler edgings, though the extension of the black of the head on the neck in front is by no means a special nor reliable character of this species. Specimens in the collection of the Smithsonian Institution are from Mirador and Orizaba, Mexico, and from Guatemala.

#### 5. *Astragalinus*.

##### 11. *CHRYSOMITRIS TRISTIS*, (Linnæus.)

*Fringilla tristis*, Linn., Syst. Nat., i. p. 181, (1758.)

*Fringilla Taria*, Müll., Syst. Nat., Supp., p. 163, (1776.)

*Carduelis americana*, Rich and Sw., Faun. Bor. Am., ii. p. 268, (1831.)

Wils., Am. Orn., i. pl. 1. Aud., B. of Am., pl. 33. Oct. ed., iii. pl. 181. Buff., Pl. Enl., 292.

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Numerous specimens, all of which are from North America.

12. *CHRYSOMITRIS YARBELLI*, (Audubon.)

*Carduelis Yarbelli*, Aud., Syn. B. of N. A., p. 117, (1839.)  
Aud., B. of Am., pl. 433, fig. 4, 5. Oct. ed., iii. pl. 184.

Three specimens, apparently adult male and female and young male, all of which have been labelled in Europe, "Orenoque." Through the kindness of Prof. Baird, I have also before me the original specimen of Audubon, which seems to be entirely identical with the former, except that the quills are edged externally with greenish yellow. This bird is accurately figured by Audubon, as above cited, and is a strongly marked species, though apparently not known to ornithologists. At present I know of no other name for it, though it may have been given in another genus, on account of its thick and strong bill. Audubon's specimen bears no indication of locality, though stated by him to have been from California, which I regard as probably erroneous.

13. *CHRYSOMITRIS LAWRENCEI*, (Cassin.)

*Carduelis Lawrencei*, Cass., Proc. Acad., Philada., v. p. 105, (1850.)  
Pr. Acad., Philada., v. pl. 5.

Now well known as a bird of the western countries of North America, though apparently not found abundantly by collectors. This curious little bird does not intimately resemble any other in its colors or general specific characters.

6. *Pseudomitris*.

14. *CHRYSOMITRIS PSALTRIA*, (Say.)

*Fringilla psaltria*, Say, Long's Exp., ii. p. 40, (1823.)  
Bonap., Am. Orn., i. pl. 6. Aud., B. of Am., pl. 394. Oct. ed., iii. pl. 183.

Specimens from California. Apparently an abundant species in the western countries of North America; carefully figured by Bonaparte, as above cited, and sufficiently so for recognition by Audubon. The assignment of this species and the two immediately succeeding to this genus, I regard as probably erroneous.

15. *CHRYSOMITRIS MEXICANA*, (Swainson.)

*Carduelis mexicana*, Sw., Phil. Mag., 1827, p. 435.  
*Fringilla melanexantha*, Wagl., Isis, 1831, p. 525.  
*Fringilla texensis*, Giraud, B. of Tex., p. 21, (1841.)  
*Chrysomitris nana*, Bonap., Consp. Av., i. p. 516, (1850.)?  
Baird, U. S. and Mex. Bound. Rept., pl. 16. B. of N. A., pl. 54. Giraud,  
B. of Tex., pl. 5.

From Mexico and Lower California. One specimen, labelled "Valparaiso," in the hand-writing of M. Victor Massena. Distinguishable from the next species (*C. columbiana*), only by several of the outer tail feathers being white, — a character liable to some variation, several specimens which I assign to this species having only a trace of white, and, in fact, with this character so little developed as to present a difficulty somewhat in specific distinction.

Specimens of this little bird in the museum of the Smithsonian Institution are from Texas and New Mexico, and have also been received from Costa Rica, in the interesting collections of Mr. Julian Carmiol.

16. *CHRYSOMITRIS COLUMBIANA*, Lafresnaye.

*Chrysomitris columbiana*, Lafres., Rev. Zool., 1843, p. 292.

Specimens labelled "Bogota" and "Ameriq. Merid." Singularly like the preceding, but with the tail entirely black.

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The three last species, here given as *C. psaltria*, *C. mexicana*, and *C. columbiana*, and so given also generally by modern authors, I regard as very probably not belonging to this genus. In my opinion these little birds are more nearly related to the group given by Dr. Scialer as *Cyanocephalus*, and possibly are entitled to generic distinction.

June 6th.

MR. CASSIN, Vice-President, in the Chair.

Twenty-one members present.

The following papers were presented for publication :

"Descriptions of new species of Fossils from the Marshall Group of Michigan, &c." By Alexander Winchell.

"Descriptions of new species of Eocene Tertiary Fossils." By R. P. Whitfield.

Dr. Leidy exhibited some bones and teeth of Horses from California and Oregon, recently submitted to his examination by Prof. J. D. Whitney. He stated that fossil remains of Horses had been found throughout the length and breadth of the North American continent. They had been obtained from the frozen cliffs of Eschscholtz Bay, in Arctic America, and from Honduras in Central America; from New Jersey, Pennsylvania, Maryland, Virginia, North and South Carolina, Georgia, Kentucky, Mississippi, Louisiana, Missouri, Nebraska and Texas. Many of the remains are undistinguishable in anatomical character from corresponding bones and teeth of the domestic horse; others are comparatively large, though not larger than in the largest variety of the latter, but their molar teeth exhibit a more complex folding of the enamel than is seen in the domestic horse. Dr. L. considers it probable that the fossils represent several extinct species, all differing from the living horse, though this was not a matter of demonstration.

Most of the remains from California, among them an entire skull, are unchanged in appearance, and are undistinguishable from corresponding parts of the Mustang, or recent Indian Horse of the West, though taken from auriferous gravel a considerable depth from the surface.

Among the California specimens are several molar teeth having more the general appearance of true fossils than the others, though they are also but slightly changed. Two of them are second upper molars from different individuals, of more robust proportions than any of the recent looking specimens, and equal in this respect to the corresponding teeth found anywhere. One of the teeth was taken from auriferous clay at a depth of thirty feet below the surface, in Tuolumne County, and is slightly infiltrated with oxide of iron. The other was obtained from a bed of asphaltum, in company with a last lower molar, near Beuna Vista Lake, and is impregnated with bitumen. These two upper molars, strongly resembling each other, differ from the more recent looking specimens, and from the corresponding teeth of the domestic horse, in the remarkable degree of simplicity of the enamel folding, as seen on the triturating surfaces. They differ in another circumstance, which is perhaps accidental, or at least was dependent on the peculiar character of the food, that is to say, the triturating surface, in both specimens, is remarkably flat, whereas, in the horse ordinarily it is worn into two transverse hills. Dr. L. was disposed to view these teeth as representing a species different from any heretofore indicated, and proposed for it the name of *Equus occidentalis*. The measurement of the specimens are as follows: Antero-posterior diameter of triturating surface  $14\frac{1}{2}$  lines,  $15\frac{1}{2}$  lines; transverse diameter of do.  $12\frac{1}{2}$  lines,  $13\frac{1}{2}$  lines.

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June 13th.

MR. CASSIN, Vice-President, in the Chair.

Nineteen members present.

June 20th.

MR. CASSIN, Vice-President, in the Chair.

Sixteen members present.

The following papers were presented for publication :

"New species of Mordellidæ." By C. A. Helmuth, M. D.

"Note on the species of Myodites," and "Notes on the species of Harpalus, &c." By John L. LeConte, M. D.

"On a new Genus of Serraninæ." By Theo. Gill.

The death was announced of Mr. William Parker Foulke, member of the Academy, on the 18th inst.

By resolution, Mr. Aubrey H. Smith was requested to prepare a biographical notice of Mr. Foulke for publication in the Proceedings.

Dr. Leidy directed the attention of the members to some shells, bones, fragments of pottery, &c., which had been recently obtained at Cape Henlopen. He stated that, during the last week, he had accompanied a small party in a steamboat excursion to the Delaware Breakwater. The boat having anchored inside the latter, he went ashore opposite the little town of Lewes and strolled along the beach towards the light-house. About half a mile inland, and about a mile from Lewes, he observed large accumulations of shells. These extended over a space of about half a mile, at the foot of a high sand dune which had encroached upon and partly destroyed a forest of pine and cedar trees. The accumulations of shells consist mainly of those of oysters and clams, many of large size, but most of them small, and generally more or less comminuted, as if by the action of fire. The loose white sand of the piles, when scraped from the surface, exhibited intermingled black pulverulent matter, apparently carbonaceous, and in some places pieces of charcoal. Many fragments of rude pottery were strewed among the shells, being of the sort made by the Indians, and consisting of baked clay with powdered shells. Some of the fragments are coarsely ornamented on the exterior. On scraping the sand and shells at random, a clay smoking-pipe was discovered. The specimen, exhibited by Dr. Leidy, is about four inches long, and has a conical bowl, bent at an obtuse angle from a thick stem and ornamented with bands and triangles of points. A few rude arrow heads and many small chips of yellow and red jasper were found among the heaps. In one of the piles portions of a human skeleton were discovered, of which Dr. L. exhibited fragments of the skull, jaws, and a humerus.

Dr. L. observed that, notwithstanding the interest of this North American Indian "Kjökkenmödding," or kitchen refuse heap, he had but an hour to examine it.

The part of Cape Henlopen on which the accumulations are situated is composed of loose white sand with few pebbles or shells, and is remarkably barren. Oysters and clams are not now found living within some miles of the shell heaps. The Captain of the steamboat, who lived at Lewes, stated that the heaps were known to the neighboring people under the name of Indian heaps.

1865.]

June 27th.

MR. CASSIN, Vice-President, in the Chair.

Thirteen members present.

On Report of the respective Committees, the following papers were ordered to be published :

## New Species of MORDELLIDÆ collected in Illinois.

BY C. A. HELMUTH, M. D.

## MORDELLA.

*M. lunulata*. Anal style long, slender. Last joint of maxillary palpi scalene triangular. Black; head, margins of thorax, scutellum, basal margin of elytra, a humeral lunule and suture cinereous pubescent, beneath varied with cinereous and black. ·18.

## MORDELLISTENA.

*M. intermixta*. Hind tibiæ with two equal ridges; first joint of hind tarsi with two, second with one ridge. Black; mouth, front legs and elytra piceous; pubescence of elytra dark brown, with light hairs intermixed. ·10.

*M. auricoma*. Hind tibiæ with two equal ridges; first joint of hind tarsi with three, second with two ridges. Black, linear; pubescence brown sericeous; head, antennæ, anterior half of thorax, front and middle legs ferruginous. ·11.

*M. nigerrima*. Hind tibiæ with two ridges, the anterior one extending across the tibia; first joint of hind tarsi with three, second with two ridges. Narrow, entirely black; pubescence grayish. ·09.

## Note on the Species of MYODITES Latr. inhabiting the United States.

BY JOHN L. LE CONTE, M. D.

The species of this genus are found on the flowers of *Solidago*, in the months of August and September. As they are not much sought after by collectors, several species probably yet remain to be discovered.

The following analytical table will separate the species now before me. The measurements are decimals of an English inch :

Abdomen yellow; podex piceous; elytra yellow, immaculate.

·36. Vertex prominent, acutely carinated.....1. *scaber* Lec.

·30. Vertex prominent, not carinated.....2. *semiflavus* n. sp.

Abdomen of both sexes black.

·24. Vertex obtusely rounded, elytra yellow. 3. *luteipennis* n. sp.

·28. Vertex prominent, slightly carinated; elytra sparsely punctured, with the base and outer margin black.....4. *fasciatus* Lec.

·30. Vertex acutely prominent and carinated; elytra densely punctured, with the base and outer margin blackish.....5. *Walshii* n. sp.

·12—14. Vertex slightly but acutely prominent; elytra fuscous; middle and tip pale.....6. *styloides* Newman.

1. *M. scaber*. Niger, confertim subtiliter punctatus, vertice conico, apice acute breviter carinato; thorace linea dorsali tenuissima elevata; elytris

[June,



politis, luteis parce subtiliter punctatis; abdomen (feminæ) flavum, fortiter punctatum, segmentis anticis dorsalibus fere lævibus, ultimo dorsali piceo; pedes nigri. Long. .35.

*Myodes scaber* Lec. Proc. Acad. Nat. Sc. 6, 67.

One mutilated female, from Creek Boundary Survey. Collected by S. W. Woodhouse, M. D. The antennæ are wanting. The wings as usual, in the females have a broad fuscous band near the tip.

2. *M. semiflavus*. Niger, subtiliter minus dense punctatus, vertice obtuse conico, apice haud carinato; thorace basi rotundato, linea dorsali nulla; elytris politis lævibus, flavis, callo humerali obscuro; abdomen (feminæ) flavum parce subtiliter punctatum, apice piceum; pedibus testaceo variegatis. Long. .30.

Maryland. One specimen given me by Rev. J. G. Morris.

The antennæ are wanting. The anterior feet are entirely testaceous, with the base of the thighs dusky; the middle thighs are dusky, and the tibiae and tarsi testaceous; the hind feet are entirely dusky. The wings have a broad smoky band near the tip.

3. *M. luteipennis*. Niger, capite, thoraceque minus dense punctatis, vertice tumido, apice rotundato, haud carinato; thorace plaga lævi utrinque ornato; basi rotundato, medio minute emarginato; elytris politis flavis, basi fortius, apice parce punctatis, callo humerali fusco, abdomen subtiliter minus dense punctatum; antennæ fuscæ, pedes anteriores flavo-testacei, postici nigri. Long. .24.

New York. Two females given me by Mr. Koestlin. Very distinct by the obtusely rounded vertex. The wings have a broad fuscous band near the tip.

4. *M. fasciata*. Niger, subtiliter dense punctatus, et breviter pubescens, vertice conico, apice carinato; thorace linea dorsali brevi impressa; basi late rotundata medio paulo emarginata; elytris politis, parce punctatis, flavis, basi margineque externa usque ad medium nigris; abdomen fortiter punctatum; antennæ fuscæ; pedes picei tarsis testaceis; antici testaceo-marginati. Long. .26.

Leconte, Say's Entom., Writings, 2, 162.

*Dorthesia fasciata* Say, Journ. Ac. Nat. Sc. 3, 274.

Two females from Pennsylvania.

5. *M. Walshii*. Niger subtiliter dense punctatus et breviter pubescens, vertice anguste elevato et carinato; thorace plaga parva lævi utrinque ornato, linea dorsali nulla, ad basin rotundato; elytris subopacis, rugulosis, subtilius punctatis, flavis, basi margineque externo ad medium nigris; abdomen dense punctatum; antennæ fuscæ; testaceæ pedes fusco-testacei; femoribus anterioribus basi, posticisque fuscis. Long. .20.

One male. Rock Island, Illinois. B. D. Walsh, Esq. The wings are entirely hyaline. Distinct from *M. fasciatus* by the vertex being less prominent, and therefore appearing more acute at the tip, by the base of the thorax being not emarginate at the middle, and by the finer and denser punctation of the elytra.

6. *M. styloides*. Niger, capite punctato, vertice medio submucronato; thorace confertim subtilius punctato, plaga magna lævi utrinque signato; elytris subtiliter rugosis, punctatis, nebula media, margineque apicali pallidis, ore pedibusque obscure testaceis; antennis fusco-testaceis. Long. .12—.14.

*Myodes styloides* Newman, Ent. Mag. 5, 376.

? *Dorthesia flavicornis* Say, Journ. Acad. Nat. Sc. 3, 274.

*Myodes flavicornis* Lec., Say's Ent. Writings, 2, 162.

Washington, D. C.; Baron Osten Sacken; Canada, Mr. William Couper.

The front and mouth are usually dark testaceous; the vertex has a small

acute tubercle; the punctures of the thorax are fine, and there is a smooth space each side of the middle. The elytra are finely rugous, sparsely punctured, and vary in color, from black to fuscous; there is a pale band at the middle, sometimes reduced to a sutural spot; the apical margin is also pale. The pectus and sides of the abdomen are tolerably coarsely punctured. The antennæ are fuscous, sometimes paler; the feet are dark testaceous. The wings of the male are transparent; in the female there is a subapical fuscous cloud as usual.

In none of my specimens are the antennæ bright yellow, as described by Say, and I therefore suppose his description to refer to a species unknown to me.

7. *M. americanus* Guérin, Dict. Class. d'Hist. Nat. xi. 369. Icon. Régne An. tab. 34, fig. 5.

Unknown to me; seems by the figure to be an entirely black species, about the size of *M. fasciatus*.

#### Notes on the Species of *HARPALUS* inhabiting America, north of Mexico.

BY JOHN L. LE CONTE, M. D.

My attention has been recently drawn to the essay on classification of the Harpalini of Denmark, by Schiödte,\* and I have attempted by aid of the ideas therein developed to group our species in a natural manner. In doing this, I have noticed peculiarities in some of them, which seem to show that the characters used in the essay quoted do not possess the value that has been attributed to them by the author.

Thus, for example, in the first division (genuine Harpalini,) *Bradycellus* is separated from all the other genera by the last joint of the palpi being attenuate, and the body smooth; in the other genera the last joint of the palpi is fusiform, and the body reticulate.

I find that this is correct, as far as relates to the genera allied to *Anisodactylus*; but fails in the others; in *Stenomorphus* and *Gynandropus* the surface is not reticulate, while in *Gynandrotarsus* it is quite distinctly so. In most species of the group (or perhaps genus) *Selenophorus* the surface is reticulate, but in the iridescent species (*opalinus* Lec., *gagatinus* Dej., and *iripennis* Say,) no trace of reticulation can be seen; in *S. fatuus* Lec. it can scarcely be observed.

Similar exceptions may be found among the typical *Harpalus*: thus in *H. amputatus* Say, the female is very finely reticulate, and the male is polished; the reticulation is scarcely perceptible in the male of *H. fallax* Lec., *megacephalus* Lec., while in both sexes of *H. spadiceus* Dej., *testaceus* Lec. and *nitidulus* Chaud., the surface is polished.

So in the *Stenolophini*, in which the body is declared to be smooth, a similar exception is seen in the finely reticulate *S. carbonarius*.

The fundamental division of the species of *Harpalus* into two groups, (I. *Setæ ambulatoriæ abdominales pilis nullis intermixtæ: setæ ambulatoriæ femorales parciore et graciliores, foveolis setigeris minutis*, and II. *Setæ ambulatoriæ abdominales pilis longioribus inæqualibus intermixtæ: setæ ambulatoriæ femorales copiosæ validiores, foveolis setigeris plerumque profundius impressis*.) seems to me also defective when applied to our species. I find that the ambulatorial setæ of the anterior thighs are more numerous and stronger in the males than in the females, and that the use of this character will be likely to lead to error. In some species I observe some long bristles about midway between the ambulatorial setæ and the side of the abdomen, which may serve to group the species in a secondary manner. I have termed them accessory setæ.

\* Krøyer, Tids. 3d ser. vol. i.

The paraglossæ of the genuine *Harpalus* are rather thick, not longer than the ligula, and are furnished on the sides with a few bristles; the ligula is broader at the tip and truncate, with the side angles acute. In *Selenophorus* the paraglossæ are flat, longer than the ligula, without lateral bristles; and the ligula is narrow, not dilated at the tip. I am therefore inclined to believe that *Selenophorus* should be considered a genus, and not a group of *Harpalus*, as I have recently placed it.

The species of *Harpalus* in my collection may be grouped as follows: (the measurements are in decimals of the English inch.)

- A. Elytra very deeply sinuate at tip; outer angle acute and dentiform in the female; third interval without dorsal puncture; abdomen finely punctured and pubescent towards the base. Body elongate.
- 56—76. Thorax narrowed behind, side margin depressed, base scarcely punctured; color dark ferruginous, elytra piceous, deeply striate. Sandy places; Middle States, Kansas.....1. *erraticus* *Say*.
  - 56—66. Thorax narrowed behind, margin not depressed, base punctulate, hind angles not rounded at tip; color nigro-piceous, antennæ and legs ferruginous. New Mexico.....2. *retractus* *Lee*.
- B. Elytra truncate, or deeply sinuate at tip; anterior tibiæ with the outer angle prolonged behind, forming a small tooth; abdomen sparsely punctured and pubescent.
- a. Elytra truncate; armed with a sutural spine in the female; dorsal puncture distinct.
    - 38—40. Thorax narrowed behind, angles rounded, basal foveæ small, punctured; color beneath dark piceous or black, above metallic blue or green, rarely black. Kansas, New Mexico, Saskatchewan, Montreal, Canada. 3. *amputatus* *Say*.
    - b. Elytra transversely sinuate, outer angle acute in female; dorsal puncture wanting; sides of elytra finely punctured and pubescent.
      - 38—40. Thorax narrowed behind, hind angles not rounded; basal foveæ small, finely punctured; color beneath dark piceous or black; legs ferruginous or black; above metallic green or coppery, rarely black. Middle States, Canada, Newfoundland.....4. *viridiansis* *Beauv*.
  - C. Elytra obliquely, but slightly sinuate at tip; abdomen without accessory setæ, finely punctured and pubescent towards the base.
    - a. Mentum tooth completely wanting; elytra without dorsal puncture; feet black.
      - 80—94. Thorax narrowed anteriorly, side margins broadly depressed, and basal foveæ densely punctulate. Middle, Southern and Western States, Canada, Kansas.....5. *caliginosus* *Say*.
      - b. Mentum tooth more or less distinct; elytra without dorsal puncture; antennæ and feet ferruginous.
        - \* Side margin of thorax depressed, scarcely wider behind; sides and base punctured.
        - † Thorax nearly square; elytra not punctulate.
        - 50. Hind angles slightly rounded; sides feebly rounded. Middle States. 6. *faunus* *Say*.
        - 42—48. Hind angles scarcely rounded; sides more rounded in front. New York.....7. *convivus* *n. sp.*
        - †† Thorax slightly narrowed behind; hind angles not rounded.
        - 54—58. Elytra punctulate, at least at the sides. Illinois. 8. *vagans* *n. sp.*

- \*\*Thorax with base and side margin densely punctulate.**
- 50—·62. Thorax narrowed in front; sides strongly depressed; elytra sparsely punctulate at the sides. Atlantic States, Kansas.  
9. *pensylvanicus*.
- Thorax slightly narrowed behind; sides feebly depressed;
- 54—·66. Hind angles less obtuse; elytra not punctulate at the sides. Atlantic States, Kansas.....10. *compars* Lec.
- 54—·64. Hind angles more obtuse; elytra finely punctured at the sides. Pennsylvania, New York.....11. *longicollis* Lec.
- 42—·48. Smaller, hind angles of thorax less obtuse; elytra not punctulate at the sides. Atlantic States.....12. *erythropus* Dej.
- \*\*\*Thorax scarcely punctured at base; sides not distinctly depressed.**
- 34. Head very large; hind angles of thorax rounded; basal foveæ slightly punctured; elytra slightly bronzed. Lake Superior.  
13. *megacephalus* Lec.
- c. Mentum tooth more or less distinct; elytra with dorsal puncture.
- \* Antennæ and feet ferruginous; bead of prothorax yellowish.
- † Thorax distinctly narrowed behind; sides not depressed.
- 38. Base of thorax not punctured; elytra not reticulate. Middle States.  
14. *spadicus* Dej.
- †† Thorax not narrowed behind; body oblong oval.
- 38. Elytra feebly bronzed; base of thorax punctured. Russian America, Saskatchewan.....15. *fulvilabris* Mann.
- Elytra not bronzed;
- ‡ Sides of thorax narrowly but distinctly depressed; (basal foveæ vaguely defined.)
- 34—·42. Hind angles slightly rounded; base finely punctured. Atlantic States, New Mexico.....16. *fallax* Lec.
- 30—·42. Hind angles not rounded; base punctured; (epipleuræ always ferruginous. Canada, Minnesota, Winnipeg.....17. *pleuriticus* Kirby.
- 30—·42. Hind angles rounded; base scarcely punctured; epipleuræ generally dark. Atlantic States, Canada, Kansas.....18. *herbivagus* Say.
- 32—·36. Hind angles scarcely rounded; basal foveæ sparsely punctulate; knees blackish; Russian America, Oregon.....19. *somnolentus* Dej.
- ‡‡ Sides of thorax scarcely depressed; base not punctured.
- 38. Hind angles rectangular; not rounded. Kansas.  
20. *ventralis* Lec.
- ††† Thorax narrowed in front; body nearly elliptical.
- 34. Sides of thorax feebly depressed; elytra reticulate. Pennsylvania, Kansas, Ft. Simpson.....21. *opacipennis* Hald.
- 26—·30. Sides of thorax not depressed; elytra not reticulate. Southern and Western States, Kansas.....22. *nitidulus* Chaud.
- \*\*Feet piceous or black; or at least thighs dark; bead of prothorax not paler.**
- Thorax narrowed in front; intercoxal process of abdomen nearly smooth.
- 30. Body elliptical; sides of thorax not depressed; elytra of male not reticulate. Kansas, Louisiana.....23. *ellipsis* Lec.
- 30—·44. Body longer oval; sides of thorax feebly depressed. California, Oregon.....24. *cautus* Dej.
- Thorax not narrowed in front; intercoxal process of abdomen punctulate;
- † Head decidedly narrower than the thorax.
- Thorax not very transverse; base punctured;

·37. Hind angles of thorax slightly obtuse, not rounded; (tibiae and tarsi ferruginous.) Lake Superior..... 25. *innocuus Lec.*

Thorax strongly transverse;

Hind angles of thorax obtuse; scarcely rounded at tip; base punctured;

·40. Sides of thorax less strongly rounded; (elytra of female without sutural spine.) Saskatchewan..... 26. *carbonatus Lec.*

·39—46. Sides of thorax more strongly rounded; (elytra of female with distinct sutural spine.) Lake Superior..... 27. *rufimanus Lec.*

·56. Hind angles of thorax obtuse, rounded at tip; base scarcely punctured. Colorado Terr..... 28. *montanus n. sp.*

·52—58. Hind angles of thorax flattened, rectangular not rounded; base sparsely punctulate. Lake Superior..... 29. *Lewisii n. sp.*

†† Head very large, scarcely narrower than the thorax.

·48—60. Sides of thorax distinctly depressed. Lake Superior.

30. *laticeps Lec.*

·56. Sides of thorax not depressed. Illinois .. 31. *viduus n. sp.*

D. Elytra very slightly sinuate at tip, (except in 39,) abdomen with accessory ambulatorial setae, proceeding from distinct punctures.

a. Mentum tooth more or less distinct.

\* Elytra with dorsal puncture; antennae concolorous, reddish brown.

† Mentum tooth very small; (larger species of dark color, with the elytra reticulate in both sexes.)

Base of thorax smooth, or scarcely punctulate; sides slightly depressed.

·58—64. Body oblong oval; elytra of female with sutural spine. Oregon. 32. *fraternus Lec.*

·46. Body oblong oval; sutural spine of female obsolete. Kansas. 33. *funestus Lec.*

·48—54. Body broader; thorax slightly narrowed behind; elytra of female with sutural spine. New Mexico and Colorado..... 34. *oblitus Lec.*

Sides of thorax not depressed; feet ferruginous.

·40. Hind angles obtuse, slightly rounded; base nearly smooth. Colorado. 35. *furtivus n. sp.*

·45. Hind angles subrectangular, slightly rounded at tip; base of thorax punctulate. Nebraska..... 36. *stupidus Lec.*

†† Mentum tooth large, prominent; smaller species of brown color; paler beneath; elytra of male smooth; of female scarcely reticulate.

·30. Sides of thorax not depressed. New Mexico, Kansas.

37. *desertus Lec.*

·30. Sides of thorax depressed, base punctured. Kansas.

38. *lucidus n. sp.*

\*\* Elytra with dorsal puncture, tip much more distinctly sinuate; antennae paler at base.

·36. Body broad, hind angles of thorax scarcely rounded; sides slightly depressed. Oregon, Idaho, Winnepeg..... 39. *obesulus Lec.*

\*\*\* Elytra without dorsal puncture; antennae paler at base.

·35. Thorax not narrowed behind, sides not depressed. Lake Superior, Canada..... 40. *varicornis Lec.*

b. Mentum tooth entirely wanting; elytra not reticulated; hind angles of thorax rectangular.

\* Elytra without dorsal puncture.

·42. Body uniformly testaceous, oblong oval. Iowa, Illinois.

41. *testaceus Lec.*

\*\* Elytra with dorsal puncture.

35. Body broad, piceous; thorax and elytra green bronzed. Texas.  
42. *gravis* Lec.

The following species are unknown to me:

- H. longior Kirby, Fauna Bor. Am. 4, 43. Found in Lat. 54°. Perhaps H. vagans Lec.  
H. basilaris Kirby, ibid. 41. Found in Lat. 54°. Seems allied to H. obesulus Lec., but the trochanters in the latter are not dark yellow, nor are the elytra chestnut black.  
H. ochropus Kirby, ibid. 42, is perhaps H. desertus Lec.  
H. albionicus Mann., Bull. Mosc. 1843, 213, agrees with immature specimens of H. cautus Dej., in my collection. Not having seen a typical specimen, I do not venture to propose the synonym.  
H. curtatus Mann., ibid. 1853, 124. Russian America.  
H. dulcicollis Féré, Rev. Zool. 1841, 44. Texas. Probably an immature form of Anisodactylus ellipticus Lec.  
H. depressicollis Motsch., Bull. Mosc. 1860, 2, 136. California.  
H. alternans Motsch., ibid. 1845, 2, 343. California.

*Descriptions of new Species.*

7. H. convivus. Elongato-oblongus, nigro-piceus, antennis palpis pedibusque ferrugineis; thorace latitudine brevior, lateribus anguste fortiter depressis punctatis, antice magis rotundatis, margine summo, ferrugineo angulis posticis fere rectis, foveis basalibus rotundatis, profundis punctatis; elytris reticulatis profunde striatis, puncto dorsali nullo; subtus piceus, abdomine rufescente, inter et post coxas parce punctulato. Long. 42—48.

One pair from New York. Related to H. faunus, but the thorax is more rounded on the sides in front, distinctly transverse, very slightly narrowed behind with the basal foveæ deeper.

8. H. vagans. Elongato-oblongus, subtus rufo piceus, supra nigro-piceus, antennis, palpis pedibusque ferrugineis; thorace latitudine paulo brevior, postice paulo angustato, lateribus anguste depressis punctatis, antice magis rotundatis, margine summo ferrugineo, angulis posticis obtusis haud rotundatis, basi dense punctato, foveis profundis vage definitis; elytris reticulatis profunde striatis, puncto dorsali nullo, interstitiis feminae omnibus, maris externis confertim punctulatis. Long. 54—58.

One pair. Western States. Quite distinct by the characters given above. Seems related to, and perhaps identical with H. longior Kirby.

11. H. longicollis Lec., Ann. Lyc. Nat. Hist. 4, 396.

I indicated this species on a single male specimen found at New York, and subsequently considered it as probably an aberrant form of H. compar, but Mr. Ulke has recently found it abundantly in the mountains of Pennsylvania. The characters in the table as well as those formerly given by me, will enable it to be recognized, and it is, moreover, much narrower in form than H. compar.

12. H. erythropus Dej. This species seems to differ from H. compar only by the smaller size, and by the hind angles of the thorax being a little less obtuse. I have some doubt about the validity of these characters as specific differences.

25. H. montanus. Oblongo-ovalis niger, antennis palpisque piceo-rufis, thorace capite latiore, latitudine sesqui brevior, lateribus rotundatis, parum depressis, obsolete parce punctulatis basi fera laevi, foveis parvis, angulis posticis obtusis apice rotundatis; elytris subtiliter reticulatis, feminae opaciusculis, striatis, interstitiis planis, 3io puncto postico impresso; abdomine pone coxas subtiliter, inter coxas vix punctulato. Long. 56.

[June,

Colorado Territory. One pair given me by Dr. S. Lewis. The suture of the female is armed with a small spine. Resembles in appearance *H. fraternus Lec.*, but besides minor differences it is readily distinguished by the absence of setigerous punctures between the ambulatorial setæ of the abdomen and the sides.

26. *H. Lewisii*. Oblongo-ovalis, niger, antennis palpisque piceo-rufis, illis articulo imo nigricante; thorace capite paulo latiore, latitudine plus sesqui brevior postice paulo angustato, lateribus rotundatis, parum depressis, basi que fere lævibus, angulis posticis subrectis, apice haud rotundatis, elytris subtiliter reticulatis, femine opacis, striatis, intertitiis planis, 3io puncto postico impresso, abdomine pone et inter coxas parce punctulato. Long. .52—58.

Marquette, Lake Superior. Collected and given to me by Dr. S. Lewis, to whom I take pleasure in dedicating this fine species. Also found in Canada.

The under surface of the abdomen and the legs in the specimens examined is piceous, but in more mature individuals will perhaps be found black. The apex of the suture of the female in *H. montanus*, *Lewisii*, *rufimanus*, *laticeps*, *viduus* and *fraternus*, is armed with a small but distinct spine, of which no trace is seen in *H. carbonatus*. Of *H. innocuus*, I have but one specimen, a male.

31. *H. viduus*. Ovalis, niger, antennis palpisque ferrugineis, thorace capite parum latiore, antrorsum subangustato, lateribus haud depressis, angulis posticis apice rotundatis, basi lævi, foveis parvis; elytris reticulatis, femine sericeo-opacis, intertitiis planis, 3io puncto postico impresso; abdomine inter et pone coxas parce punctato. Long. .56.

One female; Rock Island, Illinois; B. D. Walsh, Esq. Differs from *H. laticeps* by the hind angles of the thorax being rounded at the apex, and by the head being not quite so broad.

32. *H. fraternus*. This species is very closely allied to *H. funestus* and *oblitus*, but with specimens of each before me I am able to note the following differences:

*H. fraternus*, thorax near the basal foveæ feebly and sparsely punctulate, scarcely perceptibly narrowed behind; elytra more than  $2\frac{1}{2}$  times longer than the thorax, nearly equally shining in both sexes; sutural spine of female distinct. (5 specimens, Oregon.)

*H. oblitus*, thorax distinctly narrowed behind, basal foveæ scarcely punctulate; elytra less than  $2\frac{1}{2}$  times longer than the thorax; elytra more opaque in the female than in the male; sutural spine of female distinct. Body broader and more oblong than in *H. fraternus*. (5 specimens, Kansas and New Mexico.)

*H. funestus*, of the same form as *H. fraternus*, but smaller, with the sides of the thorax more distinctly depressed, and the suture of the female not armed with a spine at the tip. (5 specimens, Kansas and Nebraska.)

35. *H. furtivus*. Oblongo-ovalis, nigro-piceus, nitidus, subfuscus, antennis palpis pedibusque piceo-ferrugineis; thorace latitudine fere duplo brevior, lateribus rotundatis, haud deplanatis, angulis posticis obtusis subrotundatis, basi rugoso, haud punctato, foveis parvis, linearibus; elytris (maris) thorace haud latioribus, vix reticulatis, intertitiis planis, puncto postico dorsali impressis; abdomen setis accessoribus distinctis, ad basin pone coxas punctulatum, inter coxas læve; mentum dente minuto armatum. Long. .40.

Colorado Territory. One male kindly given me by Dr. S. Lewis. Seems most nearly related to *H. stupidus* in characters, although differing in 1865.]

form. The appearance is very similar to *H. fallax* Lec., but the accessory setæ of the abdomen enable it to be at once distinguished.

38. *H. lucidus*. Longior ovalis, piceus, nitidus, corpore subtilis, antennis pedibusque pallidioribus; thorace latitudine fere duplo brevior, lateribus deplanatis antice rotundatis, angulis posticis rectis rotundatis, basi usque ad latera punctato, foveis basalibus vagis; elytris pernitidis (maris) haud reticulatis, puncto dorsali distincto; abdomen setis accessoribus distinctis, basi pone et inter coxas parce punctatum; mentum dente magno armatum. Long. 30.

One specimen. Nebraska, near the Rocky Mountains. Of the same form as *H. desertus*, but with the base of the thorax punctured and the sides distinctly depressed.

39. *H. obesus*. In the list of North American Coleoptera, published by the Smithsonian Institution, I referred this species to *Bradycellus*. The examination of male specimens proves that the middle tarsi are widely dilated in that sex. In one specimen from Lake Winnipeg, the palpi have the last joint singularly impressed and concave towards the tip, which thus appears pointed when viewed in a certain direction. It is easily distinguished from the other species having accessory ventral setæ and by the elytra being quite distinctly sinuate obliquely at the tip.

On a new genus of SERRANINE.

BY THEODORE GILL.

Genus TRISOTROPIS GILL.

*Body* compressed, very oblong and subfusiform, with the caudal peduncle oblong and moderately contracted behind.

*Scales* small, regularly imbricated.

*Lateral line* parallel with the dorsal outline.

*Head* moderate, oblong-rhomboid, with the profile gradually decurved to the snout, and the lower jaw nearly rectilinear. *Eyes* oval, moderate, situated entirely in the anterior half of the head, and close to the profile. *Nostrils*; anterior small, simple; posterior large, divided inside by a horizontal ridge into an upper and lower chamber. *Preorbital* bone narrower than eye. *Preoperculum* far behind eyes, minutely serrated behind; *operculum* with three spines; the middle continued from an oblique rib on the inner surface of the bone. *Scales* extending over the whole head, except the preorbital region, and also on the jaws.

*Mouth* rather large, with the cleft moderately oblique; supramaxillaries continued backwards beyond eye.

*Teeth* of the upper jaw in the outer row moderate, little curved inwards, with one or two canine teeth on each side in front; within, moveable and recumbent, on the sides pincerlike, small inwards; in front enlarged and somewhat barbed at the points. In the lower jaw biserial on the sides; those of the outer row fixed, moderate and erect; those of the inner larger, moveable, and somewhat barbed; in front, on each side, a canine.

*Dorsal* fin with its spinous portion depressed behind, generally slightly convex, considerably larger than the soft, and with eleven (exceptionally 10—12) rather slender spines; soft portion oblong, with about sixteen to eighteen rays.

*Anal* fin under the middle of the soft dorsal, higher in front than behind, with the margin convex, and with three graduated spines and about eleven (10—12) rays.

*Caudal* oblong, slightly emarginated behind.

*Pectoral* fins moderate, convex behind.

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Ventral fins under or in front of pectorals, angular externally, attached by a small axillar membrane to the breast.

The skull differs from that of *Epinephelus* (*Serranus gigas* C. V., *S. morio* C. V., = *S. erythrogaster* Dekay, *S. lunulatus* C. V., *S. striatus* Poey ex Bl., *S. remotus* Poey—skulls known—&c.,) by the wider interorbital area, the parallelism and continuation of the lateral crests forward to the middle of the orbits, inclosing an elongated parallelogram, the surface of which, especially between the orbits, is more uniform; the absence of a frontal crest; the simple curvature or straightness of the naso-vomerine ridge and absence of the angle at the suture between the nasals and vomer.

This genus is recognizable externally by the oblong form, the peculiar structure of the nostrils, the form of the fins, &c., but is more especially distinguished by the development of the skull, which differs in a very marked manner from that of *Epinephelus*. It is closely related to *Mycteroperca* (*Serranus olfax* Jenyns) but differs in the form of the dorsal and the very scaly supramaxillaries.

Type *T. guttatus* Gill ex Bloch.

To this genus belong the *Serranus dimidiatus* Poey, *S. cameleopardalis* Poey, *S. cardinalis* C. V., (*T. guttatus* Gill ex Bloch), whose crania I have examined, and their allies, *S. interstitialis* Poey, *S. falcatus* Poey, *S. arara* Val., *S. brunneus* Poey, *S. latepietus* Poey, *S. cyclopomatus* Poey, *S. felinus* Poey, *S. rivulatus* Poey, *S. repandus* Poey, *S. petrosus* Poey, *S. tigris* C. V., *S. undulosus* C. V., and *S. acutirostris*, C. V.

It may be here remarked that all the genera of the subfamily Serraninae, established by me for West Indian species, are well distinguished by their crania, even *Lioperca*, which would perhaps be thought to be the most doubtful, being so indicated. The species with nine spines, for which I formerly proposed to retain the name *Bodianus*, are represented by two genera; one (*Enneacentrus*, type *Serranus outalibi* C. V.) with the skull channelled between the orbits and the surface uniform in texture, &c.; the other (*Petrometopon*, type *S. guttatus* Poey) distinguished by the petrous-like convexity between the supra orbital grooves, and its triangular sinus behind, into the angles on each side of which the lateral crests terminate; the crests are parallel, and the surface between flat or scarcely convex. The name *Bodianus* cannot be retained apparently for either genus, and as it was originally proposed more especially for the *Bodianus bodianus*, (*Harpe rufus*), it must either be retained for that type or consigned to that oblivion to which the utterly worthless nature of its original constitution so richly entitles it.

#### TRISOTROPIS RETICULATUS.

The height is contained four times and a half in the total length; the head three times, and the caudal more than six times. The eye is contained seven times in the head's total length, and distant about two diameters from the snout. The preoperculum behind is almost vertical, scarcely indented above the angle; finely serrated above the indentation and more coarsely between it and the angle; the inferior margin is entire. The spines of the dorsal are moderately weak; the longest contained twelve times in the length, and the tenth about seventeen times; the greatest height of the soft portion somewhat exceeds an eleventh. The pectoral equals a seventh of the length.

D. XI. 17. A. III. 11. P. 17.

The color appears to have been brownish, distributed in polygonal spots, surrounded by reticulating bluish gray broad lines which are more distinct on the head, on the hinder portion of which about four or five are on an area about the size of the eye, while around the eye and on the snout they are much smaller. The fins appear to have had no distinct delineations, and are dark purplish brown.

Two specimens of apparently the same species are deposited in the Smithsonian Museum; both were obtained at Barbados; one is about eighteen 1865.]

inches long and almost twice as large as the other. Their colors have faded, but in a proper light the evidence of the spots on the body is obtained, and those on the head are quite distinct in the adult, but in the young the spots of the body have not been found.

The species appears to be readily distinguished from any hitherto described by the system of coloration.

By special permission of the Academy, a paper was presented and referred to a Committee. The latter having made a favorable report, the paper was ordered to be published, as follows :

**Descriptions of four new Species of BIRDS from the Isthmus of Panama,  
New Granada.**

BY GEO. N. LAWRENCE.

**1. TACHYPHONUS RUBRIFRONS.**

*Tachyphonus xanthopygius*, Lawr., nec Sc. Ann. Lyc. N. Y. vol. vii. p. 331.

*Male.* Front and part of crown dull red; back part of crown, hind neck and upper part of back of a slaty brownish black; hind neck just tinged with yellowish green: lower part of back and rump bright lemon yellow; upper tail coverts and tail brownish black, the former edged with dull greenish yellow; wing coverts black, the middle and larger with lighter or slaty grey edgings; quills brownish black; under plumage plumbeous grey, the feathers of the throat with their centres lighter grey; the abdomen with a slight wash of greenish yellow; the under tail coverts margined with greenish yellow; axillars and under lining of wings white; irides reddish brown; bill and feet black.

Length (measured fresh)  $6\frac{1}{2}$  in. ; wing  $3\frac{3}{8}$ ; tail  $2\frac{3}{8}$ ; bill  $1\frac{1}{8}$ ; tarsi  $\frac{3}{4}$ .

*Habitat.*—Line of the Pan. R. Road, near Lion Hill Station.

The female is rather smaller than the male, but the general plumage is much the same; it is without the red front and has more of the yellowish tinge on the plumage.

Allied to *T. xanthopygius*, Sc. The females appear to closely resemble each other, but the males differ much in color and markings, *xanthopygius* being black below as well as above, with a scarlet post-ocular stripe and bright yellow shoulders; in my species the shoulders are black, it is without the red stripe behind the eye, and the colors of the general plumage are much as in the female.

The red on the forehead of the male extends back for about half the extent of the crown, where it is rounding in form; in the single specimen of the male the red spot is rather dull, but it may be brighter in other or older individuals, possibly as bright as the scarlet stripe in *xanthopygius*.

The first specimen I received of this species was marked as a male, which it probably is, but as it answered to the description of the female of *T. xanthopygius*, I put it in my Cat. of Pan. Birds, as that species, supposing it to be young and still in the plumage of the female. I have since received the male described above, and two females.

**2. ANTHUS (NOTIOCORYS) PARVUS.**

*Anthus rufus*, Lawr., nec Gm. Ann. Lyc. N. Y. vol. vii. p. 322.

*Male.* Upper plumage dark brown, the feathers margined with pale fulvous, the lighter margins most conspicuous on the hind neck; outer tail feather white, with a portion of the margin of the inner web at the base brown, the next feather white with the margin of the inner web brown almost to the end, the other tail feathers brown; wing coverts brown with pale fulvous margins; quills brown with very faint paler edgings; under plumage

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whitish, tinged with very dilute tawny yellow; across the upper part of the breast is a tawny colored band, spotted with brown; upper mandible blackish brown, the lower yellowish with the tip dusky; irides brown; tarsi and toes pale yellow.

Length (fresh measure)  $4\frac{1}{2}$  in.; wing  $2\frac{5}{8}$ ; tail  $1\frac{1}{2}$ ; bill  $\frac{3}{8}$ ; tarsi  $\frac{1}{2}$ .

*Habitat*.—The Savannah near Panama City.

The female is smaller and has the margins of the feathers above more rufous and distinct; the hue of the under surface much more tawny, especially the sides which are conspicuously spotted, as well as the breast; the outer tail feathers are of a light fawn color.

Length (fresh)  $4\frac{1}{2}$  in.; wing  $2\frac{3}{8}$ ; tail  $1\frac{1}{2}$ ; bill  $\frac{5}{16}$ ; tarsi  $1\frac{1}{8}$ .

I determined this species to be *A. rufus* from specimens in the Phil. Acad.; these being mounted, the comparison could not be made satisfactorily, except as regards general appearance, in which they are much alike. The Panama species, however, is smaller, the lengths of the two sexes taken from fresh specimens, are respectively  $4\frac{1}{2}$  and  $4\frac{1}{2}$  inches, the dried skins measuring half an inch less. Since my first determination of it, I have received specimens of *A. rufus* (as I suppose them to be) from Bahia, Brazil; these now measure  $5\frac{1}{2}$  in., and probably the length of recent specimens would be fully 6 inches.

The under plumage of the Brazil species is more decidedly yellow; and in several specimens there are none resembling the female of the other species, in its tawny under plumage. The Brazil bird has the outer tail feather white, with the margin of the inner web broadly brown nearly to the end; the next feather is brown, with a wedge shaped white stripe in the centre, terminating half way from the end.

Birds from the two localities are certainly different, though I may err in calling those from Brazil, *A. rufus*. However, as it differs in its diminutive size, together with some other characters from all described species, I have no hesitation in deciding that it is new.

Prof. Baird (Rev. Am. Birds, p. 157) considers its nearest ally to be *Neocorys Spraguei*, which species I state that it resembles in habits, in my first account of it. Prof. Baird proposes for it a new subgenus, viz. *Notiocorys*. He also expresses a doubt of my identification of it as *A. rufus* being correct.

### 3. *THAMNOPHILUS NIGRICRISTATUS*.

*Male*. Crown deep black, on the front a few feathers are narrowly pencilled with white; upper plumage black, regularly banded with lines of white; the feathers of the throat and the sides of the head have black centres, with their outer edges white; tail black, all the feathers marked on the margins of both webs with roundish white spots, six on each side; quills black, the outer webs marked with white spots of a quadrate form; wing coverts black; all terminating in white; the feathers of the under plumage marked with alternate bars of greyish white and black; upper mandible black, the lower plumbeous, paler at the end; irides yellow; feet black.

Length (fresh) 6 in.; wing  $2\frac{1}{2}$ ; tail  $2\frac{1}{8}$ ; bill  $1\frac{1}{8}$ ; tarsi 1.

*Habitat*.—Line of Pan. R. R., Lion Hill Station.

*Female*. Crown dark cinnamon, the feathers of the hind neck and sides of the head pale cinnamon, with black centres; wing coverts and outer margins of quills and back bright cinnamon; tail dark cinnamon; inner webs and ends of the quill feathers blackish brown; throat grey with a slight cinnamon tinge, under plumage clear cinnamon, much paler than the back; the middle of the abdomen whitish; under lining of wings pale cinnamon; inner margins of quills of a light salmon color; bill and feet as in the male.

This species differs from *doliatus* and *affinis* in having no white in the crest; *doliatus* is darker below, the black bands being nearer together; it also differs from *affinis* in having the white markings above smaller and more distinct; in that species they are more linear in form; the female of the new species is very different from that of *affinis*, being much brighter and clearer in color; it is 1865.]

destitute of all markings except on the hind neck and sides of the head, whereas the female of *affinis*, besides its duller plumage, has the wing coverts brownish black barred and tipped with rufous, and the smaller quills barred and spotted with black; there are also black spots on the upper part of the breast, and faint indications of narrow bars on the upper and under plumage.

I have enlarged more in pointing out wherein this species differs from *affinis* for the reason, that I sent it to Mr. Solater for publication (with some other birds) in the Ibis, more than two years since. He returned it marked "*affinis*;" to this opinion I demurred on the ground of that species having the crest largely white, which in this is entirely black. I so wrote him; he replied that not having the specimens before him he could not then determine, but would do so when examining Mr. Salvin's collection received from Panama. In the List of that collection given, Proc. Zool. Soc. June, 1864, I notice *T. affinis* is given, and referring the bird I called *T. doliatatus*, (Ann. Lyc. N. Y. vol. vii. p. 293,) to the same species; this specimen was in McLeannan's first collection; when I received the collection made by Messrs. McLeannan and Galbraith, I noticed that the species now described was not *doliatatus*, but supposed it was similar to the one so called in my Catalogue, without comparing them. I thereby misled Mr. Solater, as I have since found that the specimen in Mr. McL.'s first collection is *T. radiatus*. But as Mr. Solater only saw the specimens now described, of course these are the ones alluded to as being "*affinis*."

I do not pretend to say that the specimens received by Mr. Salvin from the Isthmus and put in the List as *affinis*, are the same as mine now described. There is every probability of *affinis* being found there, and I should not like to give an opinion about their specimens without seeing them, therefore only speak of my own.

#### 4. GEOTRYGON ALBIVENTER.

*Geotrygon violacea*, Lawr., nec Temm. Ann. Lyc. of N. Y., vol. vii. p. 477.

*Geotrygon* ———? Sol. et Salv. P. Z. S. 1864.

*Male*. Front pale rosaceous, crown dull brownish violet; region of the ears to hind neck bluish cinerous; upper part of back of a rich reddish violet; back, wing coverts and tail dark cinnamon or rufous brown, tinged with violet; the primaries are of a lighter cinnamon color than the tail, with their inner webs dusky near their ends, the other quills are darker, becoming brownish next the back; all the quills and larger wing coverts have their ends margined with light cinnamon, inside of which is a dusky narrow subterminal band; the under wing coverts are white with their ends blackish brown; the axillars are blackish brown at the base, remaining half white; throat, sides, abdomen and under tail coverts pure white; feathers of thighs brown ending in white: the feathers on the middle of the breast are of a light brownish ash, with their ends pale rufous, the lower part and sides of the breast are of a light pinkish lilac, these seem like new feathers; and the whole breast in a more mature bird is probably of this color; it becomes paler as it extends downwards, and gradually merges into the pure white of the abdomen; bill and legs in the dried specimen brownish yellow.

Length 9 in.; wing  $5\frac{1}{2}$ ; tail  $3\frac{1}{2}$ ; bill  $\frac{5}{8}$ ; tarsi  $\frac{1}{2}$ .

*Hab.*—Line of Pan. R. Road, near Lion Hill Station.

My identification of this species as *violacea*, Temm., was made from his description and plate, Knip, Fig. t. 29, but I had misgivings as to its correctness. I then was not aware of their being two specimens of that species in the Mus. of the Phil. Acad., which came from the Rivoli Collection. I have since compared my specimen with these and find it quite distinct.

*G. violacea* has the crown, back and wings greenish bronze; the upper part of the back violet blue, and the tail and quills of a lighter red than in my species.

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July 11th.

MR. CASSIN, Vice President, in the Chair.

Thirteen members present.

The resignation of Dr. B. H. Rand, as Recording Secretary, was read.

The following papers were read and referred to a committee :

"Remarks on the genus *Taxocrinus*, &c., with descriptions of new species," and "Descriptions of new species of Crinoidea, &c." By F. B. Meek and A. H. Worthen.

The deaths of Joseph Hopkinson, M. D., Mr James Dundas, Mr. J. Reese Fry, and Mr. Richard Price, late members, were announced.

July 18th.

MR. CASSIN, Vice President, in the Chair.

Eleven members present.

The following paper was read and referred to a committee :

"On *Amphibamus grandiceps*, &c." By Prof. E. D. Cope.

July 25th.

MR. CASSIN, Vice President, in the Chair.

Nine members present.

On Report of the respective Committees, the following papers were ordered to be published.

**Descriptions of New Species of FOSSILS, from the Marshall Group of Michigan, and its supposed equivalent, in other States; with Notes on some Fossils of the same age previously described.**

BY PROFESSOR ALEXANDER WINCHELL.

The following paper is intended to constitute a further contribution to our knowledge of certain western rocks occupying a position near the boundary line between the carboniferous and Devonian systems.\* The materials for this paper have been in part collected by the writer in Michigan, Ohio, Indiana, and Iowa. Further material has been found amongst the *investiganda* of the "White Collection" of the University of Michigan. Col. Charles Whittesey's collection of fossils from the "Fine Grained Sandstone" of Ohio, has also been placed in the writer's hands for study. In addition to this, the latter has spent several days with Prof. James Hall in his cabinet, engaged in making direct comparisons between the fossils of the rocks under consideration, and the types of the Chemung group, preserved in his magnificent collection. An opportunity has also been enjoyed of making a hasty survey of the fossils from the same horizon, contained in the extensive collection of the Illinois Geological Survey, for which the writer's acknowledgments are due to the Director, A. H. Worthen, Esq.

The reader will observe that all the identifications heretofore made with typical Chemung fossils from New York and Pennsylvania, have been aban-

\* Former papers by the writer, on the same subject, may be referred to as follows: "First Biennial Report" of the Geological Survey of Mich. 1860; Amer. Jour. Sci. and Arts, [2] Vol. xxxiii. p. 362; ib. [2] xxxv. p. 61; Proc. Acad. Nat. Sci. Phil., Sept. 1862, p. 406; ib. Jan. 1863, p. 2.

done. On critical comparison between actual specimens, it has appeared that the differences—some of which have always been admitted—are of too important a character to permit the identification formerly assumed. On the other hand, the following paper discloses an extended network of identifications amongst the fossils from States west of Pennsylvania. But perhaps the most interesting feature of all is the identification of four western species with fossils, contained in the supposed carboniferous conglomerate of western New York. These are *Euomphalus depressus*, Hall, (= *Straparollus Ammon*, White), *Cypricardia contracta*, Hall, (= *Edmondia* ? *bicarinata*, Winchell), *Edmondia æquimarginalis*, Win., and *Allorisma Hannibalensis*, Shumard.\* Considering the small number of fossils as yet discovered in this conglomerate, in New York—and these only at one locality (four miles north of Panama, Chautauque County)—so considerable a number of identifications is calculated to excite some surprise, and not a little hope, that we are getting glimpses of the clue to a solution of geological difficulties of long standing.

But further than this, two of the above species—*Edmondia æquimarginalis* and *Allorisma Hannibalensis*—occur in what has been regarded as another conglomerate, whose position is beneath the first and at the top of the Chemung rocks of Western New York.

In the light of these identifications, and in the absence of all identifications between western species and those of the Chemung, as well as between the species of this conglomerate and those of the Chemung, it might not seem unreasonable to doubt its affinities with recognized Chemung rocks, and to suspect its continuity with the supposed "carboniferous conglomerate," until observation shall have demonstrated that its stratigraphical position is really below that formation. And further, since we must probably abandon the attempt to coördinate the Chemung of New York with the fossiliferous portions of the sandstones and shales of the west lying between the "Black Slate" and the coal conglomerate, it seems not unlikely that we may yet be able to prove the conglomerates of Western New York to be the attenuated and littoral eastern prolongation of those western sandstones and shales—at least of the superior and fossiliferous portions of them; so that the latter would stand as a hitherto unrecognized group of strata lying at the very base of the carboniferous system; while the Chemung rocks of New York fall within the Devonian system, toward which the writer is now inclined to think that their paleontological affinities attract them.

It yet remains to determine by observations in the field, whether the so-called "carboniferous conglomerate" of Western New York is really the equivalent of the coal conglomerate of Ohio; and whether any actual junction of superposition can be discovered in Western Pennsylvania or Eastern Ohio, between the Chemung rocks in their westward prolongation and the fine grained sandstones and gritstones of the Western States.

The total number of species at present described from the rocks under consideration is about 379, of which 170 were first described by the writer, and four have been recognized as belonging to undescribed genera. The number of species noticed in the present paper is 94, of which 36 are described as new species, and two are made the types of new genera.

#### *Descriptions and Notes of Species.*

##### CONOPOTERIUM n. gen.

*Etymology.* Κώνος, a cone, and ποτήριον, a little cup.

*Generic Characters.* Corallum compound, generally free, sometimes adherent, but without a distinct base of attachment. Cells somewhat crowded,

\* The writer is under special obligations to Prof. Hall for the unreserved liberality with which he has been allowed to examine the specimens in his cabinet, as well as for many kindnesses incident to the generous hospitality of his house.

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rapidly enlarging, inseparable, with only occasional and rudimentary diaphragms, and no radial lamellæ. Walls marked internally by vertical striæ, and a few pores which communicate between the cells. Exterior, where exposed, covered by an epitheca, marked only by irregular encircling striæ. Cells increasing laterally and interstitially.

This genus, perhaps, approaches nearest to *Sphenopoterium*, Meek and Worthen. It differs in the absence of the cuneate form of the base even in *Sphenopoterium*—the cell mouths in this genus being turned indifferently in all directions. The cells also are smaller and more numerous; and the fewer mural pores communicate from cell to cell, instead of terminating in the intercellular substance. But one species has thus far been observed.

*CONOPOTERIUM EFFUSUM* n. sp. Corallum small, spheroidal, consisting of 20 to 50 cells, which are crowded, subcircular or irregularly angulated in transverse section, feebly striated internally, and having a thick, feebly wrinkled epitheca. Specimens presenting cells of all sizes. Some tendency is manifest toward a proliferous growth; some of the lateral cells becoming adherent by their sides to a foreign body.

Diameter of largest mass, .58; diameter of mouth of largest cells, about .20.

From the Lithographic Limestone, Clarksville, Mo., "White Collection" of the University of Michigan.

#### ZAPHRENTIS, Rafinesque et Clifford.

*ZAPHRENTIS* *IDA* n. sp. Coral simple, of medium dimensions, in the general form of an inverted cone, strongly curved, with numerous encircling wrinkles of growth, and an occasional deep constriction. Epitheca rather thick, though the vertical lamellæ show faintly on the exterior. Cup very oblique, turned toward the shorter side, with a distinct fossette reaching from the centre to the shorter side. Radial lamellæ 31 in a specimen .62 inch in diameter. On the side opposite the fossette is a thick lamella reaching from the periphery to the centre; one-sixth of the circumference on each side of this is another lamella reaching to the centre, and at the same interval from these are two others; in the fossette, near the periphery, is the rudiment of a sixth. The remaining lamellæ do not extend to the centre but become confluent in each sextant, with the principal lamella which lies between them and the fossette—the fossette taking the place of a principal lamella. There are thus, in each sextant, four subordinate lamellæ joining their primaries, except that in one of the sextants adjacent to the fossette there appears a supernumerary lamella, caused apparently by the splitting of the shortest subordinate or the one next the fossette. Taking no account of this anomaly, the whole number of lamellæ is 30, a multiple of six instead of four.

The spaces between the lamellæ are intersected by thin transverse diaphragms arranged at unequal distances, and either flat or concave upwards. There is no correspondence in the positions of the diaphragms in contiguous interlamellar spaces; and the wrinkles of the epitheca sustain no relation to them, since they are not continuous, but are intercepted by vertical interlamellar walls; and besides, they nearly disappear in the peripheral region of the internal cavity.

Collected by A. Winchell, in the Goniatite Limestone at Rockford, Indiana.

The septal system of this coral is described above as senary instead of quaternary. The senary arrangement, as a fact, is sufficiently apparent; and yet it must probably be regarded as illusory—the primary lamellæ being four instead of six, and the illusion being produced by the mode of confluence of the lamellæ of the second and third cycles.

*Zaphrentis acutus*? White and Whitfield.

Occurs in the Lithographic Limestone of Clarksville, Missouri. "White Collection" of the University of Michigan.

## FAVOSITES, Lamark.

*FAVOSITES*? *MANCUS* n. sp. Coral a small hemispherical mass, with an obtuse apex; principal cell-mouths very small, sub-circular; those occupying the interstices smaller and angular; cell-walls strong, prominently raised above the general surface. Cells rapidly enlarging and multiplying by frequent gemmation. No pores, striæ or diaphragms have been discerned.

Diameter of polypary, '68 inch; largest cell-mouths, '05 inch in diameter.

This differs from *F. divergens*, White and Whitfield—the only other species described from rocks of this age—in its extremely diminutive proportions, and in the apparent absence of diaphragms. There is perhaps as much reason for referring this species to *Conopoterium* as to *Favosites*.

Collected by A. Winchell, in the Goniatite limestone of Rockford, Indiana.

*TREMATOPOERA*? *VESICULOSA*, Win. Specimens undistinguishable from the Iowa species, in their existing state of preservation, have been collected by A. Winchell, at Alan's quarry, in Hillsdale, Michigan.

*LINGULA CUYAHOGA*, Hall. Numerous specimens, not distinguishable from this species, were obtained by the writer from fragments of a hard, calcareous, brecciated rock, quarried from a well on the premises of Judge Alan, at Hillsdale, Michigan. The geological position is apparently in the lower part of the Marshall group. The rock here is the nearest approach in physical characters that has yet been seen to the Goniatite limestone at Rockford, Indiana.

Occurs also in the "Fine-grained sandstone beneath the coal at Ward's mine, Wethersfield, Trumbull County, Ohio—conglomerate wanting." Whittlesey's collection.

## DISCINA, Davidson.

*DISCINA GALLAHERI*, n. sp.

Shell of medium size, nearly circular. Ventral valve with the apex slightly excentric; foramen lanceolate, reaching from near the apex four-fifths the distance to the margin, and acute at both extremities. Surface marked by about fifteen rigid, sharp, sub-equidistant striæ, which are somewhat more approximated toward the apex. The striæ are less distinct on the shell than upon the cast.

Dorso-ventral diameter about 1.0; transverse diameter about 1.0; distance from apex to dorsal side, '48; length of foramen, '33.

Found at Hillsdale, Michigan, on the premises of Rev. F. A. Gallaher, in a small loose fragment having the lithological characters of the lower gray portions of the neighboring Marshall sandstone. It occurs also in Col. Whittlesey's collection from Girard and Wethersfield, in Trumbull County, Ohio.

I at first referred the specimens to *D. Newberryi*, Hall, (xvi. Rep. N. Y. Regents, p. 30,) but direct comparison with the types of that species shows that it differs in having more remote, stronger and more regularly equidistant concentric striæ. In its striation it resembles *D. grandis*, Hall, from the Hamilton group, but the form is more circular and the striæ are relatively less remote.

*DISCINA CAPAX*, White, (1864.) Identified in Whittlesey's collection, "from rocks next below the coal canal level, one mile below Girard," and also at "Girard, Trumbull County," Ohio.

The types of *D. Newberryi*, Hall, (1864,) do not seem to be distinguishable from this species.

## PRODUCTA, Sowerby.

*PRODUCTA GRACILIS*, n. sp. Shell small, aperture of the ventral valve forming a little more than a semicircle. Ventral valve moderately inflated for a Producta, with flattened, smooth, triangular auriculations; hinge-line equal

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to greatest width of shell; mesial sinus wanting or barely perceptible; external surface marked by fine, rigid, sharp, once dichotomizing radial lines or ribs, numbering about 40. No indications of spines have been detected.

Length of hinge line, .29 (100); length from beak to anterior margin, .21 (72).

Described from an imperfect ventral valve; but its peculiar characters easily distinguish it.

Museum of University of Michigan, Collected by A. Winchell at Valley Forge, one and a half miles below Cuyahoga Falls, Ohio.

*PRODUCTA DUPLICOSTATA*, n. sp. Shell rather large with subcircular outline. Ventral valve very ventricose and greatly arched, with steep slopes to the right and left margins, not enlarged at the aperture, and entirely destitute of mesial sinus; marked with numerous interruptedly and irregularly striate sinuous ribs, which dichotomize once or twice in the middle region of the valve, and towards the front resolve themselves each into a fasciole of three or four smaller ribs, themselves raised into a wider rib-like elevation around the anterior margin. The tubular spines are scattered over the whole exterior, but become much more abundant at the commencement of the marginal costate ridges. The whole exterior of the cast is marked also by oblique punctations, which are placed mostly in irregular lines between the ribs, and become consequently most abundant toward the margin. On the sides of the cast the punctations become elongated into short furrows which cross the surface obliquely.

Length, 1.19; breadth, 1.24; convexity of ventral valve, .58; number of marginal ridges, 15 to 20.

Collected by A. Winchell, at Battle Creek, Michigan. Occurs also in Licking County, Ohio.

*PRODUCTA MORBILLIANA*, n. sp. Shell small, transversely subelliptic, only moderately produced. Hinge line seven-eighths the greatest width of the shell; ears small, nearly right angled. The shell regularly contracts from the aperture to the beak, which is small, subacute, and projects slightly beyond the hinge. The arching of the shell is such that when resting on the aperture the greatest height is equal to one-half the greatest width. No sinus or flattening present. The surface is marked by a series of deep, continuous, equidistant wrinkles, ten or eleven in number, becoming obscure toward the beak; between the wrinkles are numerous fine concentric striae not easily seen without a magnifier. These features are crossed by a longitudinal system which, near the beak, is a set of fine regular costae, which near the middle become interrupted by the wrinkles, and, losing their identity, result in several concentric bands of short longitudinal tubes buried in the substance of the shell, and gradually emerging and presenting their apertures anteriorly.

Transverse diameter of aperture, .58 (100); length of hinge line, .51 (88); distance from hinge line across the aperture to opposite side, .44 (76); height of shell when resting on the aperture, .26 (45).

From the base of the Burlington limestone, Burlington, Iowa. "White Collection" of the University of Michigan.

A cast from the yellow sandstone below (probably "No. 5,") is probably identical with this.

This beautiful species is most nearly related to *P. speciosa*, Hall, (xth Rep. N. Y. Reg. p. 176.) The resemblance, however, is not striking, except in the cast referred to. This differs in having the pustules more regularly arranged in concentric bands. *P. morbilliana* may also be compared with *P. Rogersi*, Nor. and Prat., (Jour. Acad. Nat. Sci. Phil. [2] iii. 9, pl. i. 3, a, b, c, not *P. aspera* McChesney.) It is, however, a much neater species, without trace of sinus, not so full near the beak, while the rib-like tubes arranged

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along the concentric bands are smaller and more regular. Its nearest foreign analogue is *P. punctata*, Sowerby, (Min. Conch. iv. 22, pl. 323.) Its surface features, in point of regularity, are intermediate between the extremes presented by that variable species; but it differs constantly in the absence of a sinus.

*PRODUCTA CURTIROSTRA*, n. sp. Shell of moderate size, semi-globoid, with-out mesial sinus. Hinge line nearly equal to greatest width of valve, with but slight flattening in the region of the extremities. Beak scarcely surpassing the hinge line, extremely flattened; general surface regularly convex, marked by numerous interrupted, sub-obsolete costæ, and, in the umbonal region, by numerous concentric wrinkles, most distinct upon the ears. The inside of the dorsal valve presents an appearance very similar to the outside of the ventral valve.

This is the species formerly referred by me (Proc. Acad. Nat. Sci. Phil., Jan. 1863, p. 4,) to *P. speciosa*, Hall. A careful comparison of specimens, however, fail to justify this identification. It most nearly approaches *P. lacrymosa*, Hall. The remarkable features of the beak of the ventral valve, and the great concavity of the dorsal, are, however, characters which distinguish this species from all others. *P. lacrymosa* has less fulness in the region of the cardinal extremities, giving the umbo less breadth and greater isolation from the ears.

From the yellow sandstone, Burlington, Iowa. "White Collection" of the University of Michigan.

*PRODUCTA DOLOROSA*, n. sp. Shell of medium size, somewhat hemispherical, outline subcircular or somewhat transverse, truncated along the hinge line, which is considerably shorter than the greatest width of the shell. Ventral valve regularly convex, with scarcely an apparent flattening at the hinge extremities; beak depressed, obtuse, slightly surpassing the cardinal line. Dorsal valve but slightly concave, with a low and inconspicuous median septum reaching to the middle of the valve; the muscular scars presenting together a somewhat semicircular contour, in front of which the interior of the shell presents a finely papillose area. External surface presenting a series of elongated pustules, or interrupted, irregular depressed costæ, and a few coarse concentric wrinkles, between which the surface is covered with fine concentric striæ.

Length from hinge, in a straight line to front margin, .54 (66); transverse diameter, .82 (100); length of hinge line, .56 (68); depth of ventral valve, .24 (29).

This species, on casual observation, would be referred to *P. lacrymosa*, Hall, (x. Report New York Regents, p. 177.) The beak, however, is less acute and projecting, the ears less flattened, the dorsal valve less concave, and the ventral less produced. If possessed of cardinal spines it might be taken for *Chonetes truncata*, Hall. Figures D and Dd, Whittlesey, (Proc. Amer. Assoc. Cincinnati, p. 220,) may be intended for this species.

"Weymouth, Medina County, Ohio, 60 feet below the conglomerate." Whittlesey's Collection.

*PRODUCTA CONCENTRICA*, Hall. In quoting this species from Michigan, (Proc. Acad. Nat. Sci. Phil., Sept. 1862, p. 411,) it was stated that only the interior of dorsal valves had been seen in the southern part of the State. Since then I have obtained good ventral valves from Battle Creek, which agree in every respect with specimens from Burlington, Iowa.

A dorsal valve of this species was found at Rockford, Indiana, in the bluish argillaceous brecciated limestone of the famous "Goniatite bed." This species is now known to occur in Northern and Southern Michigan, at Burlington and Rockford, and probably in Missouri and Illinois.

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The young of *P. concentrica*, *Shumardiana*, *pyxidata*, *Cooperensis* and *arcuata*, present resemblances so strong that it is scarcely possible to distinguish them from each other. In the adult state, however, the last may be distinguished by its much stronger and regular costæ, its less rapid expansion and greater arcuation. *P. Cooperensis* has the form of *P. arcuata*, without its strongly marked ribs. The other three species are not satisfactorily distinguishable, even in the adult state. *P. pyxidata* was described by Hall from the so-called Hamilton shale and limestone of Hamburg, Ill., and Louisiana, Mo.; *P. Shumardiana* was described by Hall from the so-called Hamilton of Clarksville, Mo., and the so-called Chemung of Burlington; *P. concentrica* only from the latter locality. It is probable that the rocks at all of these localities are of nearly the same age. This being the case, the probability becomes strengthened that the three species first named are one and the same. If so, *P. concentrica*, having been first published, will displace the other two names.

*PRODUCTA SEMIRETICULATA*, Fleming, (*P. Martini*, (De Kow) Win. Proc. Acad. Nat. Sci. Phil. Jan. 1863, p. 4; figs. B. and Bb, Whittlesey, Proc. Amer. Assoc. Cincinnati, p. 219.) This species occurs plentifully at Battle Creek, Michigan. Collected by A. Winchell. Also in Hillsdale County. Collected by Rev. J. D. Parker.

A large specimen from the sandstones at Burlington, Iowa, resembles, in its want of mesial sinus, the forms of *P. semireticulata* occurring in the Burlington limestone, rather than its associates in the same strata. It possesses in addition, a peculiar sharpness of the ribs not seen in other specimens.

Occurs also in Whittlesey's Collection from "Weymouth, Medina county, Ohio, 60 feet below the conglomerate;" and "Sheldo's sawmill, Orange, Cuyahoga county, below the grindstone grit."

*P. Newberryi*, Hall, (x. Rep. N. Y. Regents, p. 180.) from Ohio, is perhaps too closely related to this species. Dorsal valves cannot be distinguished from dorsal valves of *P. semireticulata*, as they occur at Battle Creek, Mich. The ventral valve of *P. Newberryi* does not become so much arcuate, the concentric wrinkling is a little more wavy, and less regular, the beak is less attenuate, and projects less beyond the hinge, and the mesial depression is smaller.

*PRODUCTA COOPERENSIS*, Swallow, (Trans. St. Louis Acad. Nat. Sci. i. 640.) The hinge line is shorter than in the typical specimens, but otherwise the agreement is good.

Bed "No. 1," Burlington, Iowa. "White Collection" of the University of Michigan.

*CHONETES PULCHELLA*, Win., (Proc. Acad. Nat. Sci. Phila., Sept., 1862, p. 410.) Collected by A. Winchell at Germain's and Alan's Quarries, Hillsdale, Michigan. One specimen from this locality is larger than usual, presenting a greater elongation of hinge line, which is drawn out at the extremities to an abrupt acumination. The number of ribs is about 60. Two cardinal spines are seen on each side of the beak, making an angle of about 60° with the hinge line.

Occurs also in Ohio, at "Howland, Trumbull County, one half mile east from Center, at "Warren, Trumbull County, in coarse bedded sandstone, next below the conglomerate," and at "Tallmadge, Summit County, in a boulder, supposed to be from the shales next below the conglomerate," Whittlesey's Collection.

*C. pulchella*, in the number of its ribs, is intermediate between *C. Logani*, Nor. and Prat. and *C. Illinoisensis*, Worthen. In this character it most resembles the former, while it differs from it in the smoothness of the ribs. It 1865.]

resembles *C. setigera*, Hall, and *C. nana*, but differs from the former in having oblique instead of erect spines, and from the latter in the smaller area of the ventral valve. *C. setigera* occurs in the Hamilton and Chemung of New York, and I have identified it in the blue argillaceous shales of the Huron group of Michigan. *C. nana* is found in the corniferous limestone; and European geologists regard it as a Devonian species.

*CHONETES ILLINOISENSIS*, Worthen, (Trans. St. Louis Acad. Nat. Sci. i. 571); *C. Logani*, Hall, (Iowa Rep. p. 598, pl. xii. fig. 1a—e and 2); not *C. Logani*, Norwood and Pratten, (Jour. Acad. Nat. Sci. Phil. [2] iii. 30, pl. ii. fig. 12, a, b, c); *C. Illinoisensis*, Winchell, (Proc. Acad. Nat. Sci. Phil., Jan., 1863, p. 5). This wide spread species occurs at the Grindstone quarries at Pt. aux Barques, Mich. The specimens are smaller than the typical ones from Burlington, Iowa, and perhaps for this reason do not number as many striae around the margin; but specimens from Burlington of the same age cannot be distinguished.

Collected also by A. Winchell at Rockford, Indiana. It also occurs in the base of the Burlington limestone at Burlington, Iowa, ("White Collection") and in the fine grained sandstones of Licking County, Ohio.

This species may be confounded with *C. Shumardiana*, De Koninck; but the latter has 270 to 280 or more radiating striae, which are less distinctly isolated from each other. The former has from 100 to 125 striae.

*Chonetes geniculata*, White, (Proc. Bos. Soc. Nat. Hist. ix. 29). A single ventral valve, collected by A. Winchell at Rockford, Indiana, cannot be distinguished from this species.

*CHONETES LOGANI*, Norwood and Pratten. In a former paper I pointed out the error of Hall's identification of *C. Logani*, N. & P., though this species had not at that time fallen under my observation, and, I believe, has been seldom seen since first described. I have now, however, in some later additions to the "White Collection" of the University, a number of examples of *C. Logani*, N. & P., fully answering to the original description and figure. These specimens are from the base of the Burlington limestone, and the matrix holds *C. Illinoisensis* in the same association, as previously believed.

*C. Logani*, N. & P., as far as I have observed, is restricted to the horizon of the Marshall or Burlington sandstone—including the base of the Burlington limestone, which belongs evidently to the same epoch. Prof. Hall, however, has a small *Chonetes* from the Tully limestone, which, he informs me, he has decided to refer to *C. Logani*, (see 11th volume Palaeontology of N. Y.), a reference to which, with full acknowledgement of his superior authority, I cannot, at present, give my assent. The Tully limestone species presents a series of concentric rugosities or wrinkles, which extend both across the ribs and the intervals between the ribs; while in *C. Logani* the rugosities are feebler, and are confined to the crests of the ribs.

*C. Logani* is also recognized in Ohio, with about 40 to 50 ribs. It hence appears that the species, like *C. Illinoisensis*, Worthen, and *C. multicosata*, Winchell, ranges from the Burlington limestone into the sandstone below.

I may perhaps be permitted to add that some typical specimens of *C. Logani* in Prof. Hall's cabinet, sent to him by Dr. Norwood, are imbedded in a matrix of oolitic limestone, such as occurs at the base of the Burlington limestone.

*ORTHIS MICHELINI*, L'Évéillé, occurs in Whittlesey's collection from "Waverly sandstone, near Newark, Licking County, Ohio." Another *Orthis* from Akron, Ohio, resembles the Burlington species commonly referred to *O. Vanuxemi* (?), but differs in the parallel direction of the dental lamella, and in the very indistinct character of the radial striation.

Still another *Orthis*, received from Dr. Shumard and collected at Sulphur Springs, St. Louis County, Missouri, is perhaps the species referred by the

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Missouri geologists to *O. Michelini* (?). It is a small circular species, with extremely fine ribs or striae, apparently too obscure for either *O. Michelini* or *O. Vanuxemi*.

*ORthis FLAVA*, n. sp. Shell small, transversely oval, slightly truncate on the cardinal side. Ventral valve convex, perceptibly flattened toward the anterior margin, though without a marked sinus; most elevated near the slightly projecting beak; area rather high and broad, triangular, with an equilaterally triangular foramen; dental lamellæ slender, short, diverging at an angle of about 80°; ocluser scars small, together enclosing a longitudinally oval space, which reaches one-third the distance from the beak to the anterior margin; a median internal ridge reaches from the beak to beyond the middle of the valve. The shell was evidently thin; its surface marked by one hundred or more delicate radiating ribs, which increase by implantation.

Transverse diameter of shell .50 (100); longitudinal diameter .39 (78); depth of ventral valve .12 (24).

Burlington, Iowa, apparently from Bed "No. 1." at the base of the yellow sandstones. "White Collection," of the University of Michigan.

This species is less circular than the forms referred to *O. Michelini*, and has a more convex ventral valve and larger area. It differs from *O. impressa*, Hall, (Geol. Rep. 11th Dist. N. Y., p. 267, fig. 2), in its more transverse shape, smaller size, more convex ventral valve, and feebler sinus.

*STREPTORHYNCHUS LENS*? White, (Proc. Bos. Soc. Nat. Hist. ix. 28), "Weymouth, Medina County, Ohio, 80 feet below the conglomerate." Whittlesey's Collection.

*STREPTORHYNCHUS UMBRACULUM*? Schloth. sp. From "coarse bedded sandstone, next below conglomerate, Warren, Trumbull County, Ohio." Whittlesey's Collection.

A large, undetermined species from oolitic limestone, "No. 6," Burlington, Iowa, probably belongs here. Collected by A. Winchall.

*STREPTORHYNCHUS INEQUALIS*, White sp. From Weymouth, Medina County, Ohio, 80 feet below conglomerate." Whittlesey's Collection.

*STREPTORHYNCHUS* ——— sp.? A single interior of a ventral valve from "near Ashland, Ashland County, Ohio," resembles *S. Chemungensis*, var. *pectinacea*, Hall. (Pal. N. Y., Vol. iv.) It differs, however, in the possession of a longer hinge line, and distinct auriculations, and lacks the alternation in the size of the radial ridges.

*PENTAMERUS LENTICULARIS*, White and Whitfield. This species, described from the yellow sandstone of Burlington, occurs also in the base of the Burlington limestone. "White Collection" of the University of Michigan.

#### SPIRIGERA, D'Orbigny.

*SPIRIGERA MISSOURIENSIS*, n. sp. Shell of moderate size, broadly ovate, moderately ventricose, with lamellose exterior. Ventral valve with an extended beak, turned up at right angles with the plane of the shell, and having a circular perforation at its extremity. Between the beak and the dorsal valve is an external flattening simulating an area, but traversed by the incremental lines. Sinus a shallow but distinct groove, beginning at the beak, widening and deepening anterior to the middle, and near the middle becoming well characterized. Dorsal valve nearly circular, with straight hinge slopes, and obtuse beak closely incurved and concealed, though not in contact with the ventral beak. Mesial fold less distinct than the sinus of the ventral valve, arising near the middle of the valve. Both valves are marked by numerous strongly imbricating lamellæ of growth. Greatest thickness through the middle of the ventral valve.

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Length .69 (100); width .65 (94); thickness of both valves .41 (59).

From the Lithographic limestone of Louisiana, Missouri. White Collection of the University of Michigan. Also from the sandstone at Weymouth, Medina County, Ohio, 60 feet below the conglomerate. Whittlesey's Collection.

Close observation is necessary to distinguish this species from *S. subtilita*, Hall. That species, however, is less lamellose, the ventral sinus does not extend above the middle of the shell, and the flattening beneath the beaks of the ventral valve is wanting.

*SPIRIGERA BILOBA*, n. sp. Shell broadly ovate in outline. Ventral valve rather ventricose, with a prominent beak which is gradually recurved, and apparently minutely perforate at apex. A deep, narrow, median furrow begins at the apex and extends to the anterior margin; from the bottom of this the surface rises with a convex curvature to the summits of the two rounded ridges which constitute the most prominent portion of the valve; from these summits the curvatures continue to the right and left margins, which are thus rendered quite obtuse. The external surface is marked only by a few faint incremental lines. Shell structure fibrous. Characters of dorsal valve unknown.

Length .16; breadth .16.

Collected by A. Winchell in the Goniattite limestone at Rockford, Indiana.

This shell has somewhat the aspect of a *Centronella* or *Terebratula*, but its structure is not punctate. The unique character of the mesial furrow distinguishes it from any known species of *Spirigera*.

*SPIRIGERA OHIENSIS*, n. sp., (Figs. A and Aa, Whittlesey, Proceedings Amer. Assoc. Cincinnati, p. 220). Shell large, subcircular in outline, moderately ventricose. Ventral valve regularly arched from beak to anterior margin, having the cardinal slopes somewhat straight, and the lateral margins considerably compressed. Sinus shallow and broad, extending half way to the beak. Surface marked by numerous delicate, subequidistant, rigid, concentric striæ.

Length 1.18; breadth 1.40.

Akron, Ohio, 50 feet below the conglomerate. Whittlesey's Collection.

This species differs from *S. Hannibalensis*, Swallow, in its less ventricosity, especially around the margin, and in the absence of concentric lamellæ; it differs from *S. Missouriensis*, Win., in its transverse form, more compressed lateral margins, and its numerous and regular concentric striæ. In the last character it resembles *S. concentrica*, but the mesial sinus (and probably fold) is much less marked.

*SPIRIGERA HANNIBALENSIS*, Swallow, occurs in the Lithographic limestone at Clarksville, Missouri. White Collection of University of Michigan.

#### SPIRIFERA, Sowerby.

*SPIRIFERA CENTRONATA*, n. sp. Shell of medium size, with an elongate, cuspidate hinge margin, and, aside from the cardinal extremities, a somewhat semicircular general outline. Ventral valve of medium fulness near the umbo, somewhat depressed between there and the margins; beak elevated above the cardinal line more than one-fifth the whole length of the valve, incurved and overhanging a very narrow area. A distinct and comparatively deep sinus begins at the extremity of the beak, very gradually widening and becoming ill-defined in the middle of the valve and beyond. External surface marked by 36 to 40 ribs, of which from three to five fall in the mesial sinus. The ribs disappear on the slate cardinal expansions. One or two concentric furrows marking the middle region of the valve.

Length along cardinal line, 1.23 (100); length from beak to anterior margin, .52 (42); greatest convexity of ventral valve, .11 (9).

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Museum of the University of Michigan. Collected by A. Winchell, at Cuyahoga Falls, Ohio, in the flagstones below the conglomerate. Occurs also in Col. Whittlesey's collection from Akron, Ohio, 50 feet below the conglomerate.

This species is distinguished from all other spirifers by the association of cuspidate hinge extremities with a ribbed mesial sinus, and semicircular front margin. When the cuspidations are removed, the shell recalls *S. Marionensis*, Shumard, from the so-called Chemung of Missouri and Iowa; and, in all except the semicircular outline it corresponds with *S. cuspidatus*, Hall, (not of Martin,) from the Chemung of New York.

*SPIRIFERA SILLANA*, n. sp. Shell transverse, broadest at about the middle; anterior margin somewhat straight; ends rounded anteriorly, sub-truncate from the extremity of the greatest diameter to the cardinal side. Dorsal valve of medium convexity, arched regularly from beak to anterior margin; beak but slightly elevated above the hinge, incurved; area narrow. A well defined mesial fold extends from the beak to the front margin, rising abruptly from the general surface, and arching regularly over. The fold is marked only by incremental lines, save a faint indication of two radial ribs in the vicinity of the umbo; the other portions of the external surface are marked by one or two imbricating lamellæ of growth, and regularly formed ribs which radiate without increase in number, from the beak; eighteen or twenty of these can be distinguished on each side of the mesial fold.

Greatest transverse length, 2.1; length from beak to anterior margin, 1.05; greatest convexity of dorsal valve, .20; width of mesial fold at anterior margin, .45.

This species is readily distinguished by having an elongate form, without having its greatest length along the hinge line.

Collected by A. Winchell, at Valley Forge, one and a half miles below Cuyahoga Falls, Ohio, in fine ferruginous sandstone underlying the conglomerate. Museum of the University of Michigan.

Named in honor of Judge E. N. Sill, of Cuyahoga Falls, in acknowledgment of facilities afforded the writer in the examination of the rocks of his vicinity.

*SPIRIFERA EXTENUATA*, Hall. This Burlington species occurs at Battle Creek, Calhoun county, and Germain's quarry, Hillsdale county, Michigan. Collected by A. Winchell.

*SPIRIFERA HERTA*? White and Whitfield. A ventral valve of a spirifer differing from the above only in the absence of all trace of a mesial sinus, and in its somewhat fainter radial lines.

Bed "No. 6," Burlington, Iowa, while the typical specimens seem to come from Bed "No. 1." "White Collection" of the University of Michigan.

*SPIRIFERA VERNONENSIS*, Swallow, 1860. (Trans. St. Louis Acad. Sci. i. 644.) A specimen labelled as above by Dr. E. F. Shumard, from Sulphur Springs, St. Louis county, Missouri, too strongly resembles *S. Carteri*, Hall, 1858, (xth Rep. N. Y. Regents, p. 170,) judging by a specimen of the latter from Cuyahoga Falls, Ohio, which Prof. Hall admitted to be *S. Carteri*. Coll. A. W.

*SPRINGOTHYRIS HALLI*, Win. This peculiar form occurs at Battle Creek, Michigan. Collected by A. Winchell.

#### *SPIRIFERINA*, d'Orbigny.

*SPIRIFERINA CLARKSVILLENSIS*, n. sp. Shell small, transverse, semielliptic, with coarse plications. Ventral valve rather ventricose, most elevated toward the beak, regularly arched from beak to anterior margin; beak broad, projecting much beyond the hinge, strongly recurved; hinge line nearly as  
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long as the greatest width of the shell, forming a rounded right angle with the short lateral margins; area triangular, three and a half times as long as high, arched in the quadrant of a cylinder, striated in both directions, pierced by a foramen reaching to the very apex of the beak, nearly twice as high as broad, rounded at its upper angle. Mesial sinus deep, broad, regular, beginning at the apex of the beak, the bounding ribs forming with each other an angle of about  $22^\circ$ ; on each side of the sinus five large plications, of which only the first three reach the beak, the others terminating at the area; these are crossed by sharp, neat, imbricating lamellae of growth, of which, in the middle of the valve, about four occur in one-tenth of an inch. Dental plates short, columnar; a median internal septum reaching from a point a little posterior to the teeth, as far as the middle of the valve, thick at the bottom, thinned to an edge above. Internal surface of valve marked with numerous indented punctations. Dorsal valve unknown.

Length, .48 (71); breadth, .68 (100); length of hinge line, .52 (79); height of area, .15 (22); convexity of ventral valve, .22 (33).

From the Lithographic Limestone, Clarksville, Missouri. "White Collection" of the University of Michigan.

This species bears perhaps too close a resemblance to *S. solidirostris*, White. The single valve, however, on which the species is founded, is more convex, with more rounded ribs, less regular lamellae, a higher area and more incurved beak. This is the specimen referred to by White, (Boston Proc. ix. 25,) and doubtfully identified with *S. subtexta*, White—a Burlington limestone species.

*SPIRIFERINA BINACUTA*, n. sp. Shell of moderate size, transverse, with numerous rounded ribs and attenuate hinge extremities. Dorsal valve somewhat ventricose in the middle, regularly arched from anterior margin to the beak, becoming depressed toward the lateral extremities. Hinge line elongate, thickened at the margin, abruptly acuminate. Area narrow and long. Mesial fold little elevated above the general surface, divided by a furrow into two ribs, which, in old specimens, are again divided; ten or eleven rounded ribs on each side of the mesial fold, of which the last two or three are subobsolete. External surface finely and regularly lamellose. Substance of shell thin and apparently possessing a rather coarsely punctate structure.

Length of hinge line, .78; length from beak to base, .30.

This species is readily distinguished by its auricular acuminations and plicate mesial fold.

From the base of the Burlington limestone. "White Collection" of the University of Michigan.

*SPIRIFERINA SOLIDIROSTRIS*, White. From near Hamburg, Illinois. "White Collection." The ribs are more rounded than in the specimens from the Burlington sandstone. The same species occurs associated with *S. binacuta* in the base of the Burlington limestone.

#### RHYNCHONELLA, Fischer de Waldheim.

*RHYNCHONELLA*? *TETRAPTYX*, n. sp. Shell minute, subcircular in outline, with few and deep plications. Ventral valve moderately convex, highest in the middle, with a straight projecting beak, which is circularly perforate at apex, with a triangular opening below to the hinge. Along the middle of this valve is a very deep and very narrow sinus reaching nearly to the beak, and bounded by a very prominent rib on each side, beyond which is another smaller rib, making four in all. Dorsal valve almost strictly circular, with the same convexity as the ventral, highest also in the middle, with the inconspicuous beak closely appressed, and the middle raised into a strong plication or rib corresponding to the sinus or furrow of the ventral valve; on each side of this rib

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is another strong one, and still beyond, a very feeble one. None of the shell being preserved, no revelations are made of the minute structure.

Length, .17 (100); breadth, .15 (88); thickness, .09 (53).

Collected by A. Winchell, at Rockford, Indiana.

The straight beak of the ventral valve, and the general aspect of the shell, render the above generic reference unsatisfactory. Externally it seems to have some relations with *Trematospira* and *Leptocolia*, of Hall, while it still more strikingly resembles *Spirifer Buchianus*, de Kow, (Anim. Foss. pl. xv. bis fig. 3, and xix. fig. 6;) but until its internal characters are known, I leave it where it stands.

**RHYNCHONELLA HETEROPODIS**, n. sp. Shell small, varying from sectoriform to transversely elliptic, with moderately projecting beak; very young specimens in the shape of a barley-corn. Plications sharp, ranging in number from ten to twenty; of which three generally (sometimes two or four,) occupy the sinus of the ventral valve. This valve has a moderately sharp beak, turned back in an angle of 45° with the plane of the shell, and slit (in the cast) from the apex to the hinge; sinus deep toward the front of the mature shell, wanting in the young one; the plications on each side of the sinus variable; four in those with two plications in the sinus, six, seven or eight in those with three, and five in those with four, making the whole number of plications ten to nineteen. These lateral plications are bent backwards in approaching the margin. Greatest prominence of ventral valve near the beak. Dorsal valve more ventricose than the ventral, most prominent at the anterior margin; mesial fold much less marked than the sinus opposite, consisting of two, three, four or five plications, elevated at their extremities somewhat above the lateral plications, the remotest of which exhibit a strong downward curvature. Beak of this valve concealed beneath that of its fellow.

Length, .38 (90); breadth, .42 (100); thickness of both valves, .28 (67).

From one of the calcareous beds, "No. 4," of the yellow sandstone, Burlington. "White Collection" of the University of Michigan. Also near Hamburg, Illinois, and at Weymouth, Medina county, Ohio. Whittlesey's Collection.

I had hoped that these varying forms could be brought under one of the numerous species already described from this group. It is a much smaller shell, with more abrupt sinus than *R. pustulosa*, White, from the same locality. It is about the size of *R. camerifera*, Win., from Pt. aux Barques, but, besides wanting the long dental and median plates of that species, the sinus and fold are much more strongly marked, and the transverse diameter is relatively greater, giving the rostral region less relative prominence; and the mean number of plications is considerably less. In the rostral region it differs from *R. Sageriana*, Win., in the same manner, besides being a smaller shell with shallower sinus.

**RHYNCHONELLA PERSINUATA**, n. sp. Shell of medium size, transversely oval, with abbreviated rostral extension. Cardinal slopes nearly straight, sides rounded, front straight. Ventral valve depressed, with about twenty straight plications, of which eight occupy the broad and rather shallow sinus. Anterior margin of valve abruptly deflected. Dental lamellæ extending nearly one-third the length of the valve. The beak of this valve projects nearly in the plane of the shell, and the lateral portions of the valve are continued, without convexity, to the borders, thus giving this valve a peculiarly flattened surface—the broad sinus forming a similar plane lying at a lower level.

Transverse diameter, .67 (100); length, .52 (77); thickness of ventral valve, .16 (24).

Burlington, Iowa, in the yellow sandstone. "White Collection" of the University of Michigan.

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This shell suggests *Terebratula pleurodon*, variety *polyodonta*, Phillips, (Geol. Yorks, pl. ii. p. 222, pl. xii. fig. 27.) It is a smaller species than that, with a shallower sinus and an abruptly deflected margin.

**RHYNCHONELLA UNICA**, n. sp. Shell minute, longitudinally ovate in outline, the sides and front equally rounded, the cardinal slopes somewhat straight and the beak acute. The peculiarity consists in the arrangement of the median plications of the two valves. In the middle of the ventral valve are five sharp plications which extend to the beak; the two outer of these are very prominent, projecting above the general surface like vertical laminae; the middle three are anteriorly depressed considerably below the general surface, and constitute the mesial sinus, which extends to the middle of the valve, and thence rises above the general surface to the level of the two outer plications. On each side of the median plications are four others, which, instead of converging toward the beak in conformity with the median ones, converge toward an imaginary point some distance in front of the beak, in consequence of which the posterior extremities of two or three are overlapped by the median set. In the dorsal valve four median plications rise in an elevated band and attain an equal elevation near the front of the valve, but posteriorly, the two middle ones of the four sink below the level of the others, and are lost from sight before reaching the beak. In consequence of these arrangements, the ventral valve presents a sinus anteriorly and an elevation posteriorly; while the dorsal valve presents an elevation anteriorly and a sinus posteriorly. The two valves are about equally convex. The beak of the ventral valve projects in a tubular form slightly beyond that of the dorsal, and exhibits a circular perforation of the extremity.

Length, .24 (100); breadth, .19 (79); thickness of both valves, .15 (62).

From Bed "No. 4," Burlington, Iowa. "White Collection" of the University of Michigan.

**RHYNCHONELLA (RETZIA?) MICROPLEURA**, n. sp. Shell of medium size, Retzia-like externally. Ventral valve ovate, somewhat produced rostrally, with rather straight lateral margins, and a semi-circular anterior margin; most tumid near the beak, slightly flattened anteriorly; beak somewhat incurved; mesial sinus wanting or represented only by a slight flattening of the anterior portion; surface with two or three varices of growth, and about 50 rigid, continuous, rounded, radiating ribs, which are separated by narrower spaces.

Length of ventral valve, .59 (100); width, .48 (81); convexity, .15 (25).

Collected by A. Winchell, at Battle Creek, Michigan.

It much resembles *Retzia polypleura*, Win., of the Huron group, but the beak is less prolonged and less straight, and the width of the shell is greater. I know of no *Rhynchonella* which like this is without a sinus, and so finely ribbed at the same time. In the first of these characters it is approached by *R. Hubbardi* and *R. Sageriana*, from the same rocks.

**RHYNCHONELLA HUBBARDI**, Win. This species originally described from Marshall and Pt. aux Barques, Michigan, has since been found by the writer at Napoleon Cut in Jackson county; and also rather plentifully in some of the thin layers of sandstone at Valley Forge, near Cuyahoga Falls, Ohio. It occurs also at Talmadge, Summit county, Ohio, in beds next below the conglomerate. Whittlesey's collection.

**RHYNCHONELLA SAGERIANA**, Win. Identified in Whittlesey's collection from Weymouth, Medina county; near Ashland, Ashland county; Drew's saw-mill, Big Brook, Orange, Cuyahoga county, and two miles southwest of Northfield Centre, Summit county, Ohio.

*R. Sageriana* has remote relations to some of the forms of *R. pleurodon*, Phillips. Compare var. *Devreuziana*, De Kon. (Davidson's Mono. Brit. Carb.

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Brach. pl. xxiii. fig. 19-21.) The ribs, however, are more numerous, and the frontal commissure more deeply sinuate.

CENTRONELLA, Billings.

CENTRONELLA ALLEI, n. sp. Shell large to medium size, terebratuliform, greatest width a little anterior to the middle, contained one and one fourth times in the greatest length. Ventral valve somewhat ventricose, full to the immediate vicinity of the margin, especially along the cardinal slopes; regularly arching from beak to anterior margin, highest in the middle; anterior margin with a barely perceptible truncation; no sinus or fold present; beak produced beyond that of the dorsal valve, truncated and circularly perforate at the extremity; dental lamellæ more than one-fifth the whole length of the valve; muscular scars, consisting of one faint median linear impression, on each side of which is another, all reaching to the middle of the valve. Dorsal valve with its short imperforate beak closely concealed under that of its fellow, slightly truncate in front, but without mesial fold or sinus; regularly arched from beak to front, highest in the middle, exhibiting a convexity equal to that of the opposite valve. Muscular scars consisting of a faint but distinct linear median impression, with a much deeper linear impression on each side, and a very faint one exterior to each of these—the three principal impressions reaching to the middle of the valve. Shell thin, stony and solid; structure beautifully punctate under a lens; general surface polished, marked by a few feeble concentric lines of growth.

Length of ventral valve, .66 (100); breadth, .41 (62); convexity, .19 (29).

The dorsal valve above referred to comes from bed "No. 6," at Burlington; the other specimens are apparently from "No. 5." "White collection" of the University of Michigan. Also near Hamburg, Illinois, and at Talmadge, Summit county, Ohio. Whittlesey's collection.

Though the peculiar loop of *Centronella* has not been seen in these specimens, the characters given are so closely conformable with that genus that the reference can scarcely be questioned in the present state of our knowledge. It is a larger, more ventricose and more elongated shell than *C. Julia*.

CENTRONELLA JULIA, Win. A single small specimen of this northern species occurs in Whittlesey's Collection, from "one mile east of Orange Center, Cayahoga county, Ohio."

Specimens of this species from Pt. aux Barques, have been employed by Prof. Hall to illustrate the characters of his genus *Cryptonella*, (Trans. Albany Inst. Feb. 3, 1863, p. 4; reprinted Amer. Jour. Sci. [2] xxiv. 399.) The reference of this species to *Centronella* was made solely in the light of Billings' description and figure of that genus and comparisons with the internal structure of *Centronella glansfagea*, the type of the genus. Prof. Hall asserts that the description and figure do not bear out the reference; and, having previously founded *Cryptonella* on the external characters of certain terebratuliform species, he assumes that *Centronella Julia* affords an exhibition of the internal characters of *Cryptonella*. There is not the least doubt that the original reference of *Centronella Julia* was correct; and since its internal characters are assumed by Prof. Hall as being those of *Cryptonella*, the latter genus is thus admitted by its author to cover the same ground as the older genus *Centronella*, and must consequently pass out of use. Prof. Hall seems to have suspected this result; for in a note interpolated in the New Haven edition of his paper, (p. 405,) he refers to a drawing of a specimen of *C. glansfagea*, showing the loop, (sent him by Dr. Rominger of Ann Arbor,) and admits that the loop "shows essentially the same character as that of *Cryptonella*." He yet insists that this character is not to be inferred from Billings' original description and figure; and, expressing a doubt about the identity of Billings' type species (*C. glansfagea*) and the one figured by Rominger, "hesitates to  
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unite" *Cryptonella* and *Centronella* "until a reëxamination of the original specimens of Mr. Billings shall confirm his first observations, or show them to correspond with" *Cryptonella*. It is this hesitation to admit the inevitable consequence, and to retract his honorable and friendly, but unfounded criticism, which induces me to reassert the correctness of my generic reference of *Centronella Julia*, resting as it does upon the original description and figure, and the observed characters of the type of the genus, as well as the subsequent confirmation of the author of the genus, himself.

#### OSTREA, Linnæus.

*OSTREA PATERCULA*, n. sp. Shell adherent, thin, small, ovate, deeply boat-shaped, with the deeply excavated beak of the lower valve prominent, incurved and somewhat posterior. The muscular scar is large, transversely broad-renaliform, concave on the cardinal side, situated nearly midway between the centre of the valve and its posterior margin, and is marked by two transverse lamellose lines. The deepest part of the valve is midway between the centre and the beak; the depth is nearly the same for as great a distance on the other side of the centre. The exterior of the shell is irregular with concentric lamellose lines of growth.

Greatest length, .65 (100); greatest width, .40 (61); greatest depth of lower valve, .25 (35); depth of cavity of the beak, .15 (23).

From the buff sandstone at the base of the Burlington limestone, Burlington, Iowa. "White Collection" of the University of Michigan.

The unexpected discovery of this oyster—believed to be the most ancient at present known—together with its somewhat cretaceous aspect, awakened a suspicion that it had not been found in place. To certify myself on this point, I addressed Dr. White on the subject, and received the following reply: "The *Ostrea*, if I remember rightly, was imbedded in a white or light gray, silicious material, of chalky appearance, containing some remains of crinoids and shells. My impression is, also, that it was from a quarry about half a mile north of my residence, and in the lower bed of the Burlington limestone, and not far from its base. I think the label which accompanied it, and also my letter at the time, may be entirely relied on. I admit the possibility of error, but I do not believe there is any."

*PTERINEA CRENISTRIATA*, Win. (*Cardiopsis crenistriata*, Win., Proc. Acad. Nat. Sci. Phil. Sept. 1862, p. 417.) More perfect specimens from the typical locality of *C. crenistriata* reveal the fact that the species is possessed of an anterior wing, which is a mere flattened portion of the anterior angle of the cardinal line, with a barely perceptible sinus beneath. This feature does not belong to *Cardiopsis* as defined, and establishes a probable conformity with *Pterinea*.

The right valves—recently discovered—might be mistaken for another species. They show no radiating lines, except near the hinge, behind the beak. The concentric markings are only small, irregular wrinkles of growth, with none of the sharply raised lines which characterize the other valve. It is of course possible that these right valves belong to another species, but as they have exactly the form of the crenistriated valves, and the latter are all left valves, it seems probable that they belong together.

*PTERINEA SPINALATA*, n. sp. (*Avicula acanthoptera*, Win., Proc. Acad. Nat. Sci. Jan. 1863, p. 8; not *A. acanthoptera*, Hall, Geol. Rep. 10th Dist. N. Y. p. 263.) Careful comparison with the types of *A. acanthoptera*, Hall, convinces me that the Iowa specimens ought to be separated. The left valve of *A. acanthoptera*, Hall, has the body of the shell broader than in the Iowa specimens, and both wings are less defined. The right valves, also, are much flatter.

Amongst the Iowa specimens appear to be two types—one with the body of the valve arcuate, and the other with it straight. The former type was

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adopted for the specific description, (see the paper referred to.) The latter may constitute the type of still another species.

The species described as *Avicula Whitei*, Win., and *Gervillia strigosa*, White and Whitfield, should probably be referred to *Pterinea* in accordance with views recently put forth by Mr. Meek.

**AVICULOPECTEN CAROLI**, Win. This species first described from the yellow sandstone at Burlington, Iowa, is found also in the base of the Burlington limestone at the same locality. "White Collection."

**AVICULOPECTEN TENUCOSTUS**, Win. A very small specimen, collected by A. Winchell, at Rockford, Indiana, seems to agree with the above Burlington species.

Other specimens collected at Germain's quarry, Hillsdale, Michigan, have the same proportions and general surface characters, but they are once and a half as large as the Burlington types, and the anterior auriculation is marked by coarser, instead of finer striae. The body of the shell presents about 57 striae and the anterior ear 8.

The foreign analogue of this species seems to be *Pecten arenosus*, Phillips.

#### PERNOPECTEN, new genus.

*Etymology*.—*Perna* and *Pecten*, from a combination of some of the characters of the two genera.

*Generic Characters*.—Shell bivalve, sub-equivalve, monomyary. Valves more or less inequilateral and auriculate. Hinge line straight; hinge furnished with a central, triangular cartilage pit, and a transverse plate bearing on each side of the middle a series of smaller pits diminishing in size and depth from the centre outwards. The shell seems to be thin, and probably has a structure more like *Pecten* than *Perna*.

This genus, or subgenus is founded on *Aviculopecten limaformis*, White and Whitfield, (Proc. Bos. Soc. Nat. Hist. vol. viii. p. 295.) My attention was first directed to the peculiarity of the hinge structure in two or three specimens sent me by Dr. White himself; and an examination of a number of specimens previously referred to this species shows that they all possess it. The genus *Aviculopecten*, happily constituted by McCoy to receive a number of paleozoic species having affinities with *Pecten* in their external form, and with *Avicula* in their cardinal structure, is made by its author to differ from *Pecten* by the absence of a central ligamentary pit, and from *Avicula* by its nearly equilateral outline. The present genus differs from *Avicula* and *Aviculopecten*, and approaches *Pecten* and *Monotis*, in the presence of a mesial ligamentary pit; and it differs equally from *Pecten*, *Aviculopecten* and *Avicula*, and approaches *Perna*, by the presence of a series of isolated ligamentary pits in the cardinal area. It differs from *Perna* in its sub-central beaks, with ligamentary pits on both sides. It agrees with *Amusium* in its sub-symmetrical ears, central cartilage pit, and the absence of radiating ridges, but differs in its straight hinge line and lateral cartilage pits. The position of the genus is apparently between *Perna* and *Pecten*, with a preponderance of affinities for the latter, sufficient, perhaps, to throw it into the family of *Pectinida*, White. *Aviculopecten* is grouped with the *Aviculida*.

It is probable that in addition to the two following species, others referred to *Avicula*, *Pterinea*, and more especially *Aviculopecten*, *Amusium* and *Pecten*, will be found to possess the assemblage of characters shown in *Pernopecten*. *Lima? obsoleta*, Hall, (Rep. 10th Dist. N. Y., p. 265,) = *Pecten subobsoletus*, d'Orb., is stated to have a "crenulated hinge line," while its external characters are quite conformable to *Pernopecten*. Not improbably *Lima glaber*, Hall, belongs in the same association. The same may be said of *Pecten densistria*, Sandb., from the *Psidomyenschiefer* of Nassau; *Avicula tumida* and 1865.]

*Avicula lævigata*, de Koninck, from the carboniferous limestone of Belgium, &c. &c.

This genus is known to have existed in the Chemung of Phillipsburg, New York,\* whence it probably continued to the epoch of the Burlington limestone. An undescribed species occurs in the fine grained sandstone of Ohio.

**PERNOPECTEN LIMÆFORMIS**, Winchell. (*Aviculopecten limaformis*; White and Whitfield.) In this typical species, the number of ligamentary pits is about seven on each side of the mesial one. The hinge line is short, and the auriculariations are small and Lima-like.

**PERNOPECTEN LIMATUS**, n. sp. Shell rather small, moderately ventricose, subcircular. Body of shell bounded by two straight lines diverging from the beak at an angle of  $126^\circ$ , and proceeding to the superior lateral margins, from which points the outline of the shell is very nearly circular. Hinge line straight, a little more than one-third the greatest width of the shell; ears very small, flattened, subequal; the anterior (of the left valve) making an angle of about  $106^\circ$  with the hinge line, and  $120^\circ$  with the body of the valve; the posterior ear forming an angle of  $129^\circ$  with the hinge line and  $146^\circ$  with the body of the shell. Beak small, inconspicuous, not projecting beyond the hinge line. Convexity of the valve nearly a segment of a sphere, a little more elevated in the umbonal region. Surface extremely smooth.

Dimensions parallel with the hinge 1.20; at right angles with the hinge 1.05; length of hinge line .40; length of anterior slope of body of valve .59; of posterior slope .47; convexity of left valve .17.

From the base of the Burlington limestone, Burlington, Iowa, a horizon identified by its fauna with the yellow sandstones below, (compare my paper, Proc. Acad. Nat. Sci. Phila., Jan., 1863, p. 25). "White Collection" of the University of Michigan.

The internal hinge structure of this species has not been observed, but the auriculariations are scarcely such as belong to *Aviculopecten*, as defined by McCoy, while they present a close conformity with the foregoing species.

*Aviculopecten occidentalis*, Win., differs from this in its longer cardinal slopes, making a smaller angle with each other, and in its longer hinge line, with larger and distinctly ribbed auriculariations.

**PERNOPECTEN SHUMARDANUS**, Winchell, (*Avicula circulus*, Hall, not Shumard). It is scarcely possible that the species identified by Hall (Iowa Rep. 522, pl. vii. fig. 9) as *A. circulus*, Shum., (Missouri Rep. 206, pl. c. fig. 14), can be the same species. Prof. Hall's figure and description do not show it; nor do specimens from the same bed, commonly regarded as *A. circulus*, Hall, present satisfactory correspondence. The shell has a much shorter hinge line, with smaller ears, joining the cardinal slopes by obtuse angles. Moreover the concentric lines are very regular, and the radial ones are faint, irregular dashes, entirely unlike the continuous and distinct though diminutive ribs of *A. circulus*, Shumard.

Yielding to the suggestion of Dr. White, I formerly identified *A. circulus*, Hall before I had seen actual specimens—with *Aviculopecten limaformis*, White and Whitfield. I am convinced, however, on careful comparison of specimens, that we must regard *A. circulus*, Hall, as a distinct species.

In general characters this species resembles *P. limatus*, and only differs in its shorter and less sharply defined cardinal slopes, and the presence of the two systems of superficial markings.

#### PINNA, Linnæus.

**PINNA? MARSHALLENSIS**, n. sp. Shell small, equivalve, compressed, lanceolate, squarely truncate and gaping at the extremity opposite the hinge, and

\* I find that Prof. Hall has also marked this form as a distinct genus.

acuminately tapering toward the opposite extremity. Anterior side nearly straight, or distinctly hollowed. Posterior side parallel with the anterior for half its length; toward the hinge gradually approaching the opposite side. The truncation is at right angles with the anterior side, leaving a broadly gaping ventral margin. External surface smooth.

Length dorso-ventrally .97 (100); greatest dimension at right angles with this .26 (27); thickness of both valves .12 (12).

Collected by A. Winchell at Napoleon cut, Jackson County, Michigan.

#### MYALINA, De Koninck.

*MYALINA LOWENSIS*, n. sp. Shell rather small, ventricose, obliquely elongate-quadrate. Umbonal ridge elevated, arched, highest about midway between the beak and the opposite end, forming an angle of  $50^\circ$  with the straight, somewhat elongate hinge line; anterior and posterior sides parallel, the former distended in a very shallow pouch just beneath the beak, the latter very slightly hollowed throughout its upper half; basal region regularly rounded, with an obtuse angulation next the posterior side. From the umbonal ridge the slope is precipitous to the anterior margin, much less so toward the posterior, and it gradually subsides into a flattening toward the dorso-lateral angle. Surface of shell nearly smooth, marked with fine incremental lines.

Greatest dimension—from beak to opposite extremity—.83 (100); length of hinge line .46 (55); diameter, at right angles with umbonal ridge, .41 (50).

From the base of the Burlington limestone. "White Collection," of the University of Michigan.

This species resembles *M. angulata*, Meek and Worthen, from the Chester limestone of Illinois, and *M. Michiganensis*, Winchell, from the Marshall group of Michigan. From the former it differs greatly in its smaller size, its shallower posterior concavity, and its less abruptly rounded base. From the latter it differs in having straighter anterior and posterior sides, giving it a more quadrate outline, a more elevated umbonal ridge, and a shorter antero-posterior dimension.

*MYALINA MICHIGANENSIS*, Win. Collected by A. Winchell at Napoleon Cut, Jackson County, and at Germain's Quarry, Hillsdale, Hillsdale County, Mich.

*EDMONDIA? BICARINATA*, Win. A species apparently identical with this occurs in a conglomerate four miles north of Panama, Chataque County, New York, supposed by Prof. Hall, in his Report on the Fourth District of New York, to constitute a portion of the Millstone Grit of Pennsylvania. It was figured and briefly characterized under the name of *Cypricardia contracta*, Hal. The later specific name must therefore be abandoned.

*EDMONDIA EQUIMARGINALIS*, Win. Specimens clearly identical with this occur in the same conglomerate with the above, as also in a conglomerate at another locality, supposed by Prof. Hall to underlie the Millstone Grit, and to constitute the terminal member of the Chemung Group.

The specimens of these two species occurring in New York, as well as the two others to be mentioned, are preserved in Prof. Hall's cabinet; and I desire to acknowledge my great obligations for the opportunity afforded of making the direct comparisons.

*EDMONDIA BURLINGTONENSIS?* White and Whitfield. A lamellibranch, too imperfect for certain determination, but closely resembling the above, occurs in Whittlesey's Collection, from a place "one mile east of Orange Center, Cuyahoga County, Ohio, 25 or 30 feet below the Grindstone Grit."

#### SANGUINOLITES, McCoy.

*SANGUINOLITES STREGATUS*, n. sp. A small species, resembling *Arca modesta* Win., from Burlington, Iowa. Unfortunately the specimen was lost while awaiting a description. It had, however, been investigated and its generic [1865.]

position fixed. Coming from a locality difficult of access, and poor in fossils, it seems proper to admit this reference to its existence.

Collected by A. Winchell at Point aux Barques, Huron County, Michigan, at the base of the Marshall group.

**SANGUINOLITES CONCENTRICA**, Win., (*Cardinia concentrica*, Win., Proc. Acad. Nat. Sci. Phila., Sept., 1862, p. 413). Collected by A. Winchell at Alan's and Germain's quarries, Hillsdale, Hillsdale County, Michigan.

This species is the analogue of *Cardinia tellinaria*, Goldf. sp., (Petr. Germ. ii. 180, pl. 131, fig. 17), but is more enrolled and more distinctly furrowed. It resembles also, in external characters, *Allorisma Hannibalensis*, Shum.

In the original description of this species, "ventral," in the second line, should be changed to "vertical."

**SANGUINOLITES HANNIBALENSIS**, Win., (*Allorisma Hannibalensis*, Shum.) The single specimen collected by the writer at Alan's quarry, Hillsdale, Michigan, less resembles the original figure than it does the Burlington specimens referred to this species. The Hannibal type is more elongate, with broader furrows.

This species also occurs, satisfactorily identifiable, in both the conglomerates spoken of under *Edmondia*.

**CARDIOMORPHA JULIA**, Win. Occurs at Napoleon Cut, Jackson County, Michigan. Collected by A. Winchell.

**LEDA BELLISTRATA**, Stevens. This has been collected by A. W. at Alan's and Germain's quarries, Hillsdale, Michigan.

#### CTENODONTA, Salter.

**CTENODONTA HUBBARDI**, Win., *Nucula Hubbardi*, Win., Proc. Acad. Nat. Sci. Phila., Sept., 1862, p. 417; ? = *Nuculites sulcatina*, Conrad, Jour. Acad. Nat. Phila., viii. p. 260, pl. xv. fig. 10). Collected by A. W. at Napoleon Cut, Jackson County.

Amongst my collections from the Marshall group are numerous specimens generically closely allied to, if not identical with, *Nucula*, from which I have described *N. Hubbardi*, *sactoralis*, *stella* and *Iowensis*—the latter having been originally described by White and Whitfield from the yellow sandstones at Burlington, Iowa. To the Iowa species I have added another—*N. microdonta*. These five species all present a line of teeth continuous from one side of the beaks to the other, without the ligamental pit which belongs to the modern species of *Nucula*. This variation attracted my attention at the very first; and I observed that the hinge characters seemed to identify the species with *Tellinomya*, Hall, and *Ctenodonta*, Salter. A species from the Hamilton group, and identified again in the Chemung group, had been described by the subsequent founder of *Tellinomya*, as *Nucula bellatula*, (Rep. 10th Dist. N. Y., p. 196); and *Nucula hians*, had also been recently described by him (xiii. Rep. N. Y. Regents, p. 110) from rocks of nearly the same age in Indiana, to say nothing of the description by Stevens of *N. Houghtoni*, from the Marshall group. Without being acquainted with the details of the hinge structure of these species last mentioned, I yielded to the influence of example in referring my species to *Nucula*. I did this the more readily, as Prof. Hall had expressed the conviction (x. Report N. Y. Regents, p. 184) that *Tellinomya* would prove to be a Silurian genus. It may be added to this, that *Nucula ventricosa*, Hall, (Iowa Rep. p. 716, pl. 29, fig. 4, 5) does not possess the ligamental pit of a modern *Nucula*, although it offers rather important departures from *Tellinomya*.\*

\* A fossil from the Coal Measures of Liasille, Illinois, usually identified with *N. ventricosa*, Hall, exhibits no ~~testa~~ whatever on the anterior side of the beaks, and thus presents generic characters heretofore unobserved. This feature is shown in several separated valves mineralized by Pyrites. This character would seem to possess equal importance with the absence of the ligamentary pit on which *Ctenodonta* has been founded.



The uninterrupted series of teeth possessed by the Nuculoid shells already referred to, from the Marshall group and its supposed equivalents, seems to constitute good grounds for a generic separation. For this hinge structure three names have been suggested. *Nuculites* was assigned by Conrad to shells having a continuous series of teeth and an internal clavicular ridge like *Cliodophorus*. This genus has a real existence in the Hamilton group. *Tellinomya* has been applied by Hall, and *Ctenodonta* by Salter, to shells having the generic characters of the species under consideration. As, however, objections have been urged against the import of the name *Tellinomya*, and, on the other hand, Prof. Hall insists upon the rights of priority over *Ctenodonta*, (x. Report N. Y. Regents, p. 181), it becomes a delicate matter to decide between the two. But since the genus *Tellinomya* was not founded upon characters possessing generic value, while the real generic characters, owing to the state of preservation of the specimens, entirely escaped observation; and, since the name proposed actually conveys a false idea of the relations of the genus, I feel constrained, in spite of my desire to perpetuate an American name, to pursue the same course as I do in regard to *Athyris* and other terms founded upon a misapprehension, and, in their meaning, at variance with facts.

In regard to *Ctenodonta Hubbardi*, I desire further to admit the possibility that this is the species described by Conrad under the name of *Nuculites sulcatina*. All that is stated in the description applies to this species; and the figure also agrees. Nothing, however, is said or shown respecting the hinge structure; and both the description and figure will apply nearly as well to *Sanguinolites concentrica*, Win., which occurs abundantly at the locality whence Conrad's specimens were obtained; while *Ctenodonta Hubbardi*, so far as I have observed, is unknown at that locality. The latter, nevertheless, approaches nearest to *Nuculites*; and it may be fair to presume that Conrad had a view of the hinge structure of the specimens he described. But it must be stated, finally, that not one of the hundreds of specimens that I have had in my hands, furnishes evidence of the existence of the internal septum which is essential to *Nuculites* and *Cucullela*. For the present, therefore, I feel compelled to regard *Nuculites sulcatina*, Con., as a species that has not yet fallen under my observation.

Conrad, in the paper referred to, has described *Nuculites mactroides*. If this is really a Nuculoid shell it approaches *Ctenodonta sectoralis*, Win., without being identical. If not a Nuculoid shell, as I suspect, it approximates *Edmondia equimarginalis*, Win., but at the same time, I could scarcely identify it. For the present, therefore, I leave it as I have left the species just referred to.

*Ctenodonta stella*, Win. (= *Nucula stella*, Win.,) also occurs at Napoleon Cut, Jackson county, Michigan.

#### SANGUINOLARIA, Lamarck.

*SANGUINOLARIA ROSTRATA*, n. sp. Shell rather large, transverse, cuneate-ovate in outline, of medium convexity. Beaks two-fifths the shell length, from the anterior end, quite prominent, and rather strongly incurved. Greatest convexity above the middle, continuing along the postero-dorsal slope. Hinge line somewhat more than one-third the length of the shell, slightly angulated between the beaks; buccal slope slightly curved, the anal nearly straight; extremities obtusely rounded; ventral margin nearly straight in the middle region, curved rapidly beyond. Longest dimension equidistant between the beaks and venter. Pallial impression deep, without sinus (?); anterior muscular pit deep on the rostral side, roundish-oval, striate radiately and concentrically; equidistant between the beaks and extremity; posterior muscular pit more elongate; a feeble ridge extends from the beak along the inner border of each muscular pit—more perceptibly the posterior. In the right valve a strong triangular cardinal tooth stands just anterior to the point

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of the beak, and is bounded posteriorly by a deep triangular pit, and anteriorly by a shallower and narrower one. Nothing further is clearly known in reference to the hinge. The shell seems to be thick and externally smooth.

Length, 1.72 (100); height, 1.13 (66); convexity of one valve, .34 (20); distance from beak to anterior extremity, .55 (32); to posterior extremity, 1.21 (70).

Collected at Battle Creek, Michigan, by A. W.

Resembles *S. similis*, Win., but differs in more prominent beak, greater convexity and straight ventral margin.

*SANGUINOLARIA SIMILIS*, Win., occurs at Napoleon Cut, Jackson county, Michigan.

#### CONULARIA, Miller.

*CONULARIA NEWBERRYI*, n. sp. Shell very small, in the form of a quadrangular pyramid, (the apex of which has been broken off in the specimen described.) The pyramid is inclined over one of the angles. Angles of the pyramid slightly rounded, and marked by a shallow groove running longitudinally. Each side is marked by sharp, raised, transverse lines, which, instead of running directly across, are angulated in the middle, so that at this point they are nearer the base of the shell by a distance equal to once and a half the distance between two lines. The distance between the lines increases from above downwards, and is everywhere equal to about one-ninth the width of the side. These transverse lines have the appearance of the projecting edges of septa, and are continuous from the middle of one of the shorter sides of the pyramid around to the same point, though the ends do not join but alternate in position. The sides of the pyramid are inclined at an angle of 30°, and, if they met at a point in the perfect specimen, it must have been about half an inch in length, with a width at base of about .17 inch.

Collected by A. Winchell, at Cuyahoga Falls, Ohio, in the water limestone below the conglomerate.

Named in honor of Prof. J. S. Newberry, M. D., equally distinguished in the service of science and of his country.

#### BELLEROPHON, Montfort.

*BELLEROPHON WHITTLESEYI*, n. sp. ("Goniatite," figs. 1 and 2, Whittlesey, Proc. Amer. Assoc. Cincin., p. 219.) Shell rather large, globoid, rapidly enlarging, umbilicus moderately large, exposing one anterior whorl. Transverse section triangularly and broadly lunate, the dorsum being slightly elevated, and the dorso-lateral slopes slightly flattened; greatest diameter of section near the umbilicus. Keel rather distinct but with an indistinct band. Surface marked by raised, rather distant striæ, which emerge from the umbilicus with a slight backward inclination, and, curving forwards, pursue a course directly across the lateral surfaces for two-thirds the distance from the lateral to the dorsal angle, where they undergo a sudden deflection backwards, making with themselves very nearly a right angle, and forming on the dorsum, by the meeting of opposite branches, a retral angle of 45°. Sinus not seen, but probably triangular and broad.

Greatest diameter of whorl, .87; dorso-ventral diameter of aperture, .57; number of striæ in one-tenth of an inch, near the aperture at the point where they turn backwards, 3 to 3½.

This species resembles *B. rugosiusculus*, Win., in general features, but lacks the longitudinal decussating striæ. It may be distinguished from all related species by the peculiar geniculation of the striæ in the dorso-lateral region.

One mile east of Orange Center, Cuyahoga county, Ohio, 20 or 30 feet below the grindstone grit. Whittlesey's collection.

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**BELLEROPHON NAUTILOIDES**, Win., (Proc. Acad. Nat. Sci. Phil. Sept. 1862, p. 427.) Collected by A. W., at Alan's quarry, Hillsdale, Michigan.

Conrad has described *B. stamineus*, from Moscow, Hillsdale county, Michigan, at which place I have observed both *B. nautiloides* and *B. galericulatus*, Win., and it is probable that he had one of these species in view in his description. The *ten words* employed in the description, however, will apply equally well to half a dozen species of *Bellerophon*; and it is hence utterly impossible to avail myself of the results of his studies.\*

**BELLEROPHON CYRTOLITES**, Hall. This widely distributed species has been found at Alan's quarry, Hillsdale, Michigan.

**PUGIUNCULUS? ACULEATUS**, Hall. This Rockford species has been collected by A. W., at Alan's and Germain's quarries, Hillsdale, Michigan.

**DENTALIUM? BARQUEENSE**, Win., (Proc. Acad. Nat. Sci. Phil., Sept. 1862, p. 425.) Additional specimens from the same locality, show that the short tubes supposed to belong to the shell structure, are not always normal to the surface; and that when the internal cylinder is removed, so as to afford a view of the inner surface of the prismatic coating, the oblong sections of the prisms as they were applied to the cylinder, look somewhat like the polyp cells shown in longitudinal sections of some branching corals; and there is seen also something like the same divergent disposition of the tubes. Moreover, the structure is extremely like that referred to in the last paragraph of my paper in the Proceedings for Sept. 1862, p. 430. This latter structure is foliaceous, but occurs at the same locality. Can these rigid stems, then, be corals with very large hollow axes?

#### METOPTOMA, Phillips.

**METOPTOMA UNDATA**, n. sp. Shell of medium size, nearly erect, apex nearly central, aperture transversely slightly elliptic; body of shell most inflated in the middle, somewhat acuminate toward the apex, and contracted at the aperture. Cast nearly smooth over the body of the shell, longitudinally undulate near and at the aperture, with a few wavy concentric lines of increment.

Height of shell, 1.15 (100); longest diameter of aperture, 1.06 (92).

From Bed "No. 5," Burlington, Iowa. "White Collection" of the University of Michigan.

The inferior side of the only specimen seen is defective; yet there are indications that it was flattened, as in the typical species of Prof. Phillips.

**PLATYCERAS PARALIUM**, White and Whitfield. Identified in the Lithographic limestone of Clarksville, Missouri. "White Collection."

A variety more robust than the typical form, and wanting in the longitudinal folds which characterize the latter, occurs in the base of the Burlington limestone at Burlington.

**PLATYCERAS VOMERIUM**, Winchell. From Sheldon's saw-mill, Big Brook, Orange, Cuyahoga county, Ohio, below grindstone grit. Whittlesey's collection.

The Ohio specimens have a dorsum not quite so acute as the Iowa types, and an aperture a little less expanded.

#### PLEUROTOMARIA, DeFrance.

**PLEUROTOMARIA QUINGUESULCATA**, n. sp. Shell of medium size depressed—conical, consisting of three or four rapidly enlarging whorls. Outer whorl

\* In the 4th line of my description of *B. galericulatus*, (loc. cit. p. 426,) for "ventrally," read "retroally."

nearly as wide as all the others, having a nearly circular section, and presenting on its exterior about five broad longitudinal furrows, covering the space from the suture above to the base below; shell otherwise apparently smooth.

Diameter of last whorl, 1.07 (100); height of spire, about .72 (87).

From the oölitic bed "No. 6," Burlington, Iowa. "White Collection" of the University of Michigan.

This species is imperfectly known, though clearly distinct from all other species of this age, and hence deserving of notice. It is probable that the base is regularly rounded into a broad and deep umbilicus, and that the aperture is nearly circular. It calls to mind *Euomphalus carinatus*, Sow., from the "Aymesbury limestone," but the sulcations are only half as numerous.

A similar species exists in Whittlesey's collection, from "Sheldon's sawmill, Big Brook, Orange, Cuyahoga county, Ohio, below grindstone grit."

*PLEUROTOMARIA VADOSA*, Hall, (xiii. Rep. N. Y. Regents, p. 108.) To Prof. Hall's description of this species, founded upon casts, may be added the following observations on the shell: The periphery of the body whorl is flattened into a sharp carina, just above which is another, heavier one, but not quite so projecting; a concave belt separates these from another pair of ridges which lie near the suture, and are interrupted by numerous regular transverse rugulations rising into minute nodes, on the ridges.

Collected at Rockford, Indiana, by A. Winchell.

*STRAPAROLLUS MACROMPHALUS*, Win. Specimens having twice the diameter of the types of the species, showing the tube septate a little more than one whorl back from the aperture. One specimen preserving the shell, shows that it was marked only by incremental lines.

From bed "No. 1," and the oölitic layer, "No. 6." "White Collection" of the University of Michigan.

*STRAPAROLLUS AMMON*, White. This Burlington species occurs in the so-called millstone grit of Western New York, and was figured as *Euomphalus depressus*, Hall, (Geol. Rep. ivth Dist. New York, p. 291.)

*ORTHO CERAS INDIANENSE*, Hall. Collected by A. W., at Alan's and Germain's quarries, Hillsdale, and Napoleon Cut, Jackson county, Michigan.

*NAUTILUS (TREMATODISCUS) DISCOIDALIS?* Win. A small fragment from Rockford, Indiana, affords strong presumption that this species existed at that locality.

#### CYRTO CERAS, Goldfuss.

*CYRTO CERAS ROCKFORDENSE*, n. sp. Shell rather large, rapidly expanding, especially toward the aperture, apparently forming, in adult age, nearly a complete whorl. In some specimens the transverse section is subcircular or laterally compressed, in others decidedly elliptic, being flattened dorso-ventrally. The curvature is rapid for a shell of so large size, which renders it necessary that the chambers should be about four times as deep on the outer as on the inner side of the whorl. Septa deeply and regularly concave; siphon small, situated close to the dorsal side. No surface markings are preserved on casts.

Transverse diameter of the last chamber, in a specimen wholly septate, 1.86 (100); dorso-ventral diameter, 1.35 (72); depth of chamber on the dorsal side, .59 (32); on the ventral side, .13 (7); diameter of siphon, .10 (5). In another specimen the transverse diameter of a section is 1.60; the dorso-ventral diameter, .170.

Collected by A. Winchell, at Rockford, Indiana.

It is impossible to affirm that this species did not describe one or more detached volutions. In case such was its character, it must have borne a close resemblance to *Nautilus cyclostomus* (Phillips) de Kon., (Anim. Foss. 553, pl. xxv. 1, a, b; xlix. 1, a, b.)

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**GONIATITES ALLBI**, Win. The most perfect specimens seen were collected by A. W., at Germain's quarry, Hillsdale, Michigan. Apertural constrictions occur at regular intervals.

**GONIATITES MARSHALLENSIS**, Win. Collected by A. W., at Napoleon Cut, Jackson county, Michigan.

Occurs also at Weymouth, Medina county, Ohio, 80 feet below the conglomerate. Whittlesey's collection.

**PHILLIPSIA**, Portlock.

**PHILLIPSIA DORIS**, Win. (= *Proetus Doris*, Hall, xiiiith Rep. N. Y. Regents, p. 112.) This species was established by Hall on some pygidia occurring in the Goniatite limestone at Rockford, Indiana. I am in possession of several pygidia from this locality which agree with his description, though in the absence of measurements, it may be that his specimens are much larger. Associated with these are numerous fragments of bucklers, which prove that the trilobite is a *Phillipsia*. The head is furnished with a border sloping downwards, and separated from the cheeks by a deep but narrow groove; the middle of the border is marked by a groove which reaches from a point opposite one eye, to the corresponding point on the other side of the head; in some specimens the latter groove reaches backward to the posterior borders of the buckler. The cheeks are raised abruptly above the border, and terminated by spinous points which are ornamented with raised longitudinal striæ, and extend backwards a distance equal to one-third the whole length of the cephalic shield. The principal lobe of the glabella is in the form of a prolate semi-ellipsoid, is almost destitute of furrows, and is supported on each side by a large complementary lobe. The surface is obscurely granulose. The pygidium is in the form of a semi-ellipse, with the longer diameter transverse; it is convex, with a gibbous axis, obtuse posteriorly, and articulated to the extremity. The lateral lobes are a little narrower than the axis, and their terminal points join the extremity of the axis. The pygidium is bordered by a plain belt curved downwards around its margin, and barely marked by a continuation of the articulations—except the two which bound it anteriorly. Number of segments in the axis, 11; in the side lobe, 7; surface the same as in the buckler.

Width of pygidium, .35; length, .21; width of axis at anterior end, .12; width of border, .04. Length of buckler of another specimen, .31.

*Proetus Missouriensis*, Shumard, (Missouri Report, p. 196, pl. B, fig. 13, a, b,) would seem also to be a *Phillipsia*, as well as its Ohio representative, *Proetus auriculatus*, Hall, (xv. Rep. N. Y. Regents, p. 107.) Pictet says of *Proetus*, "La glabelle est lobée par des sillons," and of *Phillipsia*, "La glabelle est composée d'un grande lobe median simple, et de deux petits lobes latero-postérieurs." Furthermore, *Proetus Swallowi*, Shumard, (loc. cit.) does not present the posterior termination of the great suture required by the genus to which it stands referred.

**PHILLIPSIA ROCKFORDENSIS**, n. sp. Cephalic shield surrounded by a narrow, convex border, which is bounded internally by a narrow but deep groove, and terminates posteriorly in conically tapering genal points. The principal lobe of the glabella is relatively very large, convex, highest in the middle, widened anteriorly, circularly rounded in front, and gently curved on the sides; no glabellar furrows are present. The complementary lobes are large, oval, and project laterally farther than the main lobe. The surface of the test of the glabella is finely, but sharply granulated; that of the border is finely striated. Size about the same as that of *P. Doris*.

Collected by A. W., at Rockford, Indiana.

**CYTHERE CRASSIMARGINATA**, Win. Collected by A. W., at Alan's and Germain's quarries, Hillsdale, Michigan.

UNIVERSITY OF MICHIGAN, Ann Arbor, 13th May, 1865.

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On *AMPHIBANUS GRANDICEPS*, a new Batrachian from the Coal Measures.

BY PROF. EDW. D. COPE.

The recent additions to our knowledge of the air-breathing vertebrates of the carboniferous period, are of great interest to the comparative anatomist, as furnishing new points in the series of structures between the Ganoidea and Lacertilia, or new "generalized" types combining the structures of these and of the Batrachia.

I owe to Prof. Jos. Leidy, of our University, a specimen of a reptile, belonging to the Illinois State Survey, in charge of Messrs. Meek and Worthen. It was discovered by the latter near Morris, Grundy Co., Ill., in a bed belonging to the lower part of the coal measures. It is imbedded in a concretion of brown limestone. The casts of the bones are occupied by a white friable mineral, which has probably percolated into them.

This animal combines with its Batrachian, a few Lacertilian characters, having some resemblance to Dawson's genus *Hylonomus*, and much affinity with Prof. Wyman's *Ranceps lyellii*. Its squamous integument and narrow nasal roof give it the somewhat Lacertilian physiognomy, more especially Geocotian, in its broad cranium and orbits, its large marginal palpebral scales, and rather short digits. Its true affinities are indicated by the presence of two premaxillaries, with a squamoso-postorbital arch, as in *Labyrinthodontia*, some *Batrachia Gradientia*, and *Crocodylia*; its quadratojugal arch as in *Labyrinthodontia* and *Batrachia Salientia*; its posteriorly directed oblique quadratum and lack of ribs, as in *Batrachia Salientia*; its probably short pelvis, short separate bones of the leg and fore arm; its opisthocælian dorsal vertebræ, and long caudal neural spines, as in *Batrachia Gradientia*. It is then the type of a group intermediate between the *Labyrinthodontian* and *Gradient Batrachians*, distinguished from the former by the opisthocælian vertebræ, absence of ribs, and pleurodont dentition; and from the latter by the scaly integument, absence of ribs, and structure of the nasal and prefrontal regions. But one genus of Salamanders, *Glossolega*, has a similar os quadrato-jugale, and but a part of one family, the *Salamandridæ*, the post-fronto-squamosal or posterior zygomatic arch. A ribless type might, however, well exist among *Gradientia*, when we consider the great difference between their development in *Pleurodeles* on the one hand, and *Amphiuma* on the other. From the *Salientia* the dentigerous mandible, squamosal arch, form of vertebræ, sacrum and extremities, etc., widely distinguish it. To the Batrachian orders *Labyrinthodontia*, *Gradientia*, *Gymnophidia* and *Salientia*, the present may be added, under the name *Xenorachia*.

The general form of the skull is much that of a frog, and large in proportion to the size of the animal; its length is one-half that of the spinal axis from the occiput to the middle of the sacral region, and five-sixths its own breadth in the flattened specimen. The outline is not broadly rounded, as is usual among Salamanders, but is slightly contracted, as in many frogs. The orbits are large, regularly rounded, their longitudinal diameter one and one-half times the frontal width; their point of nearest approach is behind opposite the position of the iris; one diameter measured obliquely, in advance of each extends a little beyond the common premaxillary suture.

The premaxillary bones have considerable horizontal extent, terminating opposite the narial openings, each bearing eleven or twelve teeth. Their nasal spines were in close contact, and do not appear to be prolonged backwards, as in most *Gradientia*. The external nares are rather widely separated, as in most *Gradientia*, the integument which they pierced roofing a large space between the median and peripheric bones of the muzzle. The roof of the nasal cavities is a truncate cuneiform plate, whose apex joins that of the premaxillaries. Its composition can only be conjectured, from the appearances presented by the specimen. It may be a superior ethmoid plate, as in the frogs

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Borborocoetes and others, or, more probably, a united or separate pair of free frontal, as in *Dactylethra* or *Rana*. There is no trace of the composition of nasals and frontals which occurs in the *Gradientia*, nor is such an arrangement probable, in view of the regular elongate cuneiform outline of this singular piece. A moderately distinct suture crossing the front at the anterior third of the interorbital space, which presents a regular convexity forwards, appears to be the anterior border of the frontal; the latter can scarcely be an interorbital plate of ethmoid, as it appears to unite behind by suture with the parietals. There are bosses on the prefrontal region indicating prefrontal or "lachrymal" bones similar to those in *Sceloporus* and other Lacertilian genera.

What I suppose to be the coronal suture, since it appears to be too regular to be a fracture, crosses the narrowest part of the interorbital space; it is a zigzag, presenting posteriorly a median angle, and one on each side. The posterior zygomatic arches are strong, and bound a cranial plane, which is broader than long, and exhibits nearly parallel lateral outlines. The probably small "crotaphite foramina" of the temporal fossæ appear to have been roofed over by perhaps the strong scales of the cranial integument. The quadratum is convex externally, and is directed obliquely backward to opposite the occiput; it is strongly concave in its posterior outline, indicating a large auricular meatus. Whether this was covered by scales or by an exposed tympanic drum, cannot be determined. The quadratojugal is broad and strong. The postorbital arch is continuous with the quadratum; the breadth of the two equals the frontal width. The angular process of the mandible is but little prolonged beyond the quadratum. The maxillary is toothed at least as far as opposite the malar process.

The dentition is pleurodont; the teeth are only visible on the mandible and the outer edge of the upper jaw; they are there of but one kind, small, closely set, acute-conic, not compressed, hollow, and without any inflexions of the enamel.

The integument of the head was squamous. The scales appear not to have been imbricate, and were perhaps more dense on the posterior regions, where their position is occupied by the white material before spoken of, which has here a somewhat ganoid appearance. They were more elongate on the muzzle. There appears to have been a distinct superciliary, and a postorbital row, as well as a series on the border of the upper lip. A whorl of elongate scales arranged like the pieces of an arch, surrounded the one on each side which marked the crotaphite foramen. In the specimen these are connected by a suture or line, which is regularly convex posteriorly. The superior palpebræ were covered by small separated scales, as are seen among *Geccos* and *Anoles*, and were bordered by a larger and continuous series, of about fourteen subquadrate scales. These have evidently bordered the lid, extending transversely across the orbit, and were not sclerotic scales, which are arranged round the pupil as a centre.

The vertebral column is much injured, especially in the cervical region. The dorsal vertebræ appear to have been short, and probably thirteen in number between the interscapular and sacral regions. They appear to have been constricted medially. Traces of ribs or of transverse processes are not to be found. The impression of a sacral vertebra is distinctly preserved. The caudal vertebræ were perhaps without osseous centra, as no definite impressions can be traced, and their place is occupied by the matrix. There are traces of osseous neural arches, perhaps similar to those of *Archegosaurus*, and apparently disconnected, long, compressed neural spines, and slender pleurapophyses; the latter were probably united as chevron bones. Of the former, twelve very distinct impressions may be counted to the sacral region; the posterior are most slender, the median most elevated, the anterior lower, and of greater longitudinal extent. They are more expanded in the direction

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of the axis of the body near their superior extremities, and evidently supported a flattened natatory tail, as that of *Protonopsis*. These neural spines were continued on the posterior third of the dorsal series. The visible, which is probably the greater part of the tail, enters the remainder of the column two and a quarter times, by measurement.

Sternal and hyoid pieces are not recognizable, though sundry fragments are no doubt to be referred to these regions. An impression resembling that of a raniform scapula, was probably made by that piece. The anterior limbs were short and weak. The humerus is slender; its length equals the distance between the centres of the external nares; it is apparently not much dilated, nor furnished with a process proximally, but is dilated and grooved distally, and has no condyles. The ulna and radius are separate and slender: the distal extremities of these, with the remaining bones of the anterior limbs, have been lost.

Of pelvis nothing is recognizable. The femur is slender, much dilated distally, slightly curved in the posterior direction, and without condyles. Its length is equal to the breadth of the cranial table.

The tibia and fibula are one-half the length of the femur, are slender, most dilated proximally; the antero-exterior bone is a little longer, not in contact with the inner distally, which relation I believe to be normal. The tarsus was probably cartilaginous, as in *Protonopsis* (*Menopoma*), a faint impression of the outer border remaining. It was broader than long, and without heel-like projections.

While the great shortness of the lower leg is a Salamandrine peculiarity, the length and slenderness of the digits are quite Lacertian. The leg being extended backward, the exterior or first digit is shortest, and a little less than the second. This is equal to two and one-half phalanges of the fifth, (reckoning from its base,) or the proximal pair of phalanges of the fourth. The fifth is a little shorter than the third, which is scarcely equal to the three proximal phalanges of the fourth. The number of phalanges is 3—3—4—5—4: among the Salamanders the last two numbers are usually 4—3. They are without condyles, but exhibit one or two emarginations at their articulating surfaces. The length of the basal phalanx of the first digit is two-thirds that of the second; the latter equals that of the fifth and the second phalanx of the fourth; these are very little shorter than the basal of the third and fourth. The terminal phalanges are elongate acute, those of the first and fourth slightly curved. They are much less obtuse than in Salamanders, and the animal has probably had weak claws: of these no trace remains.

A few traces indicate that the dermal integument was covered on the anterior part of the body, at least, with small and subgranular scales. There have been abdominal scales arranged in narrow imbricate series, directed inward and posteriorly. Traces of plates are wanting, excepting a small fragment lying beside the cervical vertebræ.

The length of this species from the sacral centre to the interscapular region, was 13 lines; from the latter point to the end of the muzzle, 12 lines; to the occipital border, 4.5 lines. Longitudinal diameter of orbit, 3 lines; frontal breadth, 2 lines; from border of orbit to border of nostril, 1.5 lines; breadth of cranial table, 3.75 lines. Length of humerus 3 lines; of femur, 3.6 lines; of tibia, 2.3 lines; of fifth digit, 2.75 lines; of fourth, 4.2 lines; of first, 1.8 lines. The portion of the tail preserved measures 5.2 lines.

If we compare the peculiarities of this genus with those of the Batrachia of the same period, we find it to be distinguished, independently of the ordinal characters, from such genera as *Osteophorus*, *Melosaurus*, *Scierocephalus*, *Xestorhynchus*, *Baphetes*, and *Brachyops*, by the absence of the sculpturing of the cranial bones, the lack of dermal shields, characteristic of most of these, and by the presence of cranial and palpebral scales. The crania of the first genera are much more elongate, and imitate those of some Croco-

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dilia. Similar differences exist between the Illinois Batrachian and Dendropteron (Owen); the latter possesses also a double row of teeth. Hylonomus, (Dawson), supposed to possess Lacertilian affinities, exhibits ribs and biconcave vertebræ. The ribs of Telorpeton will distinguish it also. The only genus as yet known to approach closely that under consideration, has been described by Prof. J. Wyman under the name of Raniceps.\* This animal is only known from a study of the inferior aspect of a portion of the skeleton; nevertheless it is certainly different, being nearly double the size, and having relatively longer and stronger anterior limbs. The angles of the mandible appear to have been considerably more incurved than in the Illinois species. They may have belonged to the same genus; in that case the name here given will not prove superfluous, as the older appellation was previously applied to a genus of Gadid fishes.

The name *Amphibamus grandiceps* has reference, first, to its two modes of progression; its flattened oar-like tail enabled it to swim in the waters of the swamps of the coal period, and its elongate, clawed digits indicate ambulatory power; perhaps it climbed upon the low limbs of the Sigillariæ that rose above the water. The animal was most probably nocturnal in its habits. The humors of the eye could not have escaped far beyond their natural envelopes, so that the subsequently formed limestone has been hardened, and so fractured in nearly the form of the ball. On the fractured surface below and under the remaining palpebral scales, the mineral is distinctly blackened, as by the pigmentum nigrum; below the margin of the lid this is interrupted by a discoid spot of the form and dimensions of an iris, which presents a median lenticular vacuity, again revealing the pigment, obviously the vertical pupil of a nocturnal animal. The preservation of the outline of color is certainly remarkable in a specimen of such great antiquity. A somewhat parallel case occurs in the preservation of the ink-bags of the Sepiæ; these do not date further back than the Jurassic. These appearances cannot be explained on any supposition of artificial production.

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*August 1st.*

MR. CASSIN, Vice President, in the Chair.

Twelve members present.

The following paper was read and referred to a committee:

"Descriptions of new species of fossil Crinoides, &c." By F. B. Meek and A. H. Worthen.

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*August 8th.*

DR. RUSCHENBERGER, in the Chair.

Ten members present.

The following papers were read and referred to committees:

"Notes on a species of Whale found in the River Delaware." By E. D. Cope.

"On some Conirostral Birds from Costa Rica." By Jehn Cassin.

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\* Amer. Journ. Sci. and Arts, 1856, p. 156.

August 15th.

MR. CASSIN, Vice President, in the Chair.

Eight members present.

The following papers were read and referred to committees:

"New Polyzonidæ." By H. C. Wood, Jr., M. D.

"On a new genus of Vespertilionidæ." By H. Allen, M. D.

August 22d.

MR. CASSIN, Vice President, in the Chair.

Eight members present.

August 29th.

The President, DR. BRIDGES, in the Chair.

Eleven members present.

On report of the respective committees, the following were ordered to be published.

Remarks on the genus *TAXOCRINUS*, (Phillips) McCoy, 1844; and its relations to *FORBESIOCINUS*, Keninok and Le Hon, 1854, with descriptions of new species.

BY F. B. MEEK AND A. H. WORTHEN.

The genus *Taxocrinus*, Phillips, as published by McCoy in 1844, (Carb. Foss. Ireland, p. 178,) was founded upon *Cyathocrinus? macrodactylus*, Phillips, and *Taxocrinus polydactylus*, McCoy, both of which are described, and the latter figured by McCoy, as if composed of five basal pieces directly alternating with the five radial series, the latter forming free arms without any interradial or anal pieces between. Phillips' figures of *T. macrodactylus*, however, (Palæozoic Fossils, pl. xv.,) particularly his figure *b*, certainly shows a small interradial piece wedged in between the truncated superior lateral angles of two of the first radial pieces. From these illustrations, therefore, as well as from the fact that in redescribing the genus in 1851, according to the later improved nomenclature of the parts, (Brit. Pal. Foss. p. 51,) McCoy distinctly says "five hexagonal interradial plates intervene between the second primary radials, resting on the upper lateral edges of the 1st do.,"\* it is manifest that there is generally, if not always, one or two ranges of interradial pieces, in adult examples of what are regarded in Europe as typical species of this genus, when found entire.

\* From the species included, as well as from that author's usual method of describing these parts of crinoids, it is obvious that by the words "five hexagonal interradial plates intervening, &c.," he means a single piece occupies each of the five interradial, or rather four interradial, and one anal spaces.

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The genus *Forbesiocrinus*, proposed by Koninck and Le Hon, in 1854, (*Recherch. sur les Crinoïdes*, p. 118,) was founded upon their *F. nobilis*, which they think probably the same as *Poteriocrinus ? nobilis*, Phillips, originally included by the latter author in his *Isocrinitis*, for which the name *Tazocrinus* was afterwards substituted, when he became aware of the fact that *Isocrinus* had been previously used by Meyer for another group. In their description of *Forbesiocrinus*, Koninck and Lehon characterize it as having five basal pieces, alternating with five series of primary radials consisting of four pieces each, with the anal and interradial spaces each occupied by from 12 to 13 pieces, and the axillary spaces by three small pieces each.

From all the descriptions and illustrations yet published, of the groups *Tazocrinus* and *Forbesiocrinus*, it is therefore clearly evident that these two types as understood by European authors, are distinguished by *Tazocrinus* having but one or two ranges of interradial pieces, or none, and *Forbesiocrinus* having from 12 to 13 of these pieces occupying each interradial space, and a few small pieces in the axillary spaces above. In all other points of structure, and arrangement of parts, whether of the column, basal, radial or arm pieces, they are understood and acknowledged to agree exactly. But as it has been found that typical species of *Forbesiocrinus*, possess three more or less developed basal pieces within or beneath those regarded as such by Koninck and Le Hon, (Iowa Report, p. 628,) it might be supposed this character would aid in distinguishing the two groups. It is well known, however, that American typical species of *Tazocrinus*, without interradial or anal pieces, or with but a single range of the two, such as *T. Thiemei* and *T. juvenis*, (= *Forbesiocrinus Thiemei* and *F. juvenis*, Hall, Jour. Bost. Soc. N. H. vii., 317 and 318,) possess precisely the same structure, being both described as having small basal and subradial pieces.\* Nor can we make the presence of interaxillary pieces, or the small patelliform supplementary pieces, so often seen at the sutures of the radials in well defined *Forbesiocrinus*, a means of distinction, since neither are always present in otherwise typical forms of that group with the interradial spaces filled with plates; while well marked species of *Tazocrinus*, such as *T. Thiemei* and *T. juvenis*, Hall. (sp.) the first without anal or interradial pieces, and the latter with the "interradial and anal series consisting of one plate each," are described, the first as having "arm joints showing the small patelloid plates very distinct," and the latter with "the small patelloid plates indicated by the strong curvature of the suture lines of the radial plates, becoming more distinct in the arm plates." So if we attempt to distinguish these groups at all, we must fall back upon the difference of the one group being without anals or interradials, or with but one or two ranges of these pieces, and the other with a greater number.

Now, however well this difference may serve to separate into two groups the few known European species, an attentive study of our more numerous American forms has shaken our confidence in the possibility of separating all the species hitherto discovered, into two sharply defined genera, until some more reliable characters can be pointed out. Our reasons for this conclusion will be better understood by consulting the following list of 22 American and European species and varieties, with a tabular statement of the number of the various parts of each.†

\* Our *Tazocrinus gracilis*, of this paper, with a single series of interradials, shows clearly three small pieces under the five considered the basals, by most authors.

† We have not included *Tazocrinus interscapularis*, Hall, (Iowa Report, pl. i. fig. 3,) in this list, because it deviates from the typical forms of the genus and seems allied to *Dimicrocrinus*, Phillips, though differing from that genus in not having the arms composed of a double series of minute interlocking pieces, as well as in some other points of structure.

Table showing the gradations of structure from TAXOCRINUS to FORBESIOCRINUS.

	1	2	3	4	5	6	Remarks.
	Interradials.	Annals.	Interaxillary.	Secondary do.	Primary rad.	Secondary do.	
1. <i>Tazoer. polydactylus</i> , McCoy.....	0.....	0.....	0.....	0.....	4 to 7	2.....	
2. <i>Thaemel</i> , Hall, (sp.).....	0.....	0.....	0.....	0.....	3.....	not bifur-	
3. <i>nuntius</i> , Hall, (sp.).....	0.....	0.....	0.....	0.....	3.....	cat'g again	
4. <i>communis</i> Hall, (Young).....	0.....	0.....	0.....	0.....	3.....	3.....	
5. " (Adult).....	1.....	1 & 3 rudimentary.	0.....	0.....	4.....	4 to 7.....	
6. <i>macroductylus</i> , Phillips.....	1.....	1.....	0.....	0.....	4.....	5 to 6.....	Type of Taxocrinus.
7. <i>juvencis</i> , Hall, (sp.).....	1.....	1.....	0.....	0.....	4.....	4.....	
8. <i>spinifer</i> , Hall, (sp.).....	1.....	unknown.	0.....	0.....	3.....	3.....	
9. <i>Kelloggi</i> , Hall, (sp.).....	1.....	1.....	0.....	0.....	4.....	5.....	
10. <i>ramulosus</i> , Lyon & Cass.....	1.....	3 to 6.....	3.....	1.....	4.....	4 to 6.....	
11. <i>tuberculatus</i> , Miller, (sp.).....	2.....	2.....	0.....	0.....	3.....	3.....	
12. <i>Forbestoer. asteriformis</i> , Hall.....	4.....	4.....	0.....	0.....	4 to 5.....	4 to 5.....	
13. <i>Meekii</i> , Hall.....	5 or more.....	unknown.....	2 or more.....	0.....	3 to 4.....	unknown.....	
14. " (var.).....	7.....	".....	1.....	0.....	4.....	4.....	
15. <i>Giddingsi</i> , Hall.....	8 to 10.....	many.....	1.....	0.....	4.....	4 or 5.....	
16. <i>Whitfeldi</i> , Hall.....	10.....	unknown.....	1.....	0.....	4.....	2.....	
17. <i>Shumardianus</i> , Hall.....	12 or more.....	".....	0.....	0.....	4.....	3.....	
18. <i>Agassizi</i> , Hall, †.....	15 to 25.....	30 to 40.....	3.....	1 to 3.....	3.....	3.....	Five basal pieces??
19. <i>exculptus</i> , L.&C. (sp.) †.....	20 to 25.....	5 to 7.....	1 to 3.....	0.....	5.....	4 to 6.....	
21. <i>Steffordi</i> , Hall.....	30.....	?.....	8 to 9.....	?.....	3 or 4.....	4.....	
22. <i>Wortheni</i> , Hall.....	30 or more.....	30 or more.....	10 or more.....	4 or more.....	3.....	3.....	

† By referring to the description and diagram of *Forbestoerinus Agassizi*, (Sup. Iowa Report) pages 66 and 67. It will be seen that one of the subradial pieces is there by an oversight described as the first anal. It is also worthy of note, that the diagram there given, shows clearly five basal pieces. If this is correct we may doubt the propriety of placing this species in the genus at all.

It has not been considered necessary to mention in this table the number of basal pieces, because both groups agree in having three of these pieces.

† Messrs. Lyon and Casaday described this species as the type of a new genus *Onychocrinus*, in 1889. We do not see, however, that it can be distinguished from *Forbestoerinus*, as now understood.

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From this statement, it will be seen that, starting from such forms as *Taxocrinus polydactylus*, *T. Thiemei*, &c., without interradial or anal pieces, we pass by a very easy gradation through the young of *T. communis*, having a single range of granules representing interradials, to the adult of the same, with one well developed interradial in each space, and one anal surmounted by two or three granules. Then we have several other species, with a single range of interradial and anal pieces, after which we pass to *T. ramulosus*, with one interradial, three to six anals, and three interaxillary pieces, and then to *T. tuberculatus*, with two interradial and two anal pieces in each space; after which we have *F. asterisformis*, with its four interradials and four anal pieces. Continuing down the list, we find, as we pass from species to species, the number of these intermediate plates increasing as gradually as we could expect these pieces in species of the same genus of crinoids to do, until we arrive at *F. Wortheni*, with its thirty or more interradials, and twenty or more anals. Nor is it probable this is the maximum number of these pieces sometimes visible between the rays, since it is known that in some species, such as *F. exculptus*, Lyon and Casseday (sp.), they continue on up, and pass without change or interruption, into a series forming a solid dome above. Hence it is probable that in the typical forms of *Taxocrinus*, without interradials, or but one or two ranges, and long ponderous rays, such as *T. macrodactylus*, *T. polydactylus* and *T. ramulosus*, the visceral sac corresponded in size with that of the column and rays, or in other words, extended as far up at least as the second bifurcation, and that it was merely protected by a dermal envelope between the rays and above. The fact that this integument protecting the softer parts, may have, in some instances, merely secreted a rudimentary piece at the bottom of each interradial space, or one or two well developed plates, or filled the whole space partly or entirely, or continued the process of secreting calcareous matter, until the whole summit was arched over with a solid vault, although probably presenting in the various degrees of this process good specific differences, can scarcely, we should think, be regarded in this group as presenting sufficiently important characters for the distinction of genera, especially when these differences are not coincident with any other peculiarities. In addition to this, when we bear in mind that different sized individuals of the same species, as in *Forbesiocrinus Agassizi* and *F. exculptus*, the number of interradial pieces are acknowledged to vary in the first instance from fifteen to twenty five, and in the second from twenty to twenty-five, we can readily understand that some caution is necessary in basing even specific distinctions on these differences alone.

Nor on the other hand, if we direct our attention to the primary or secondary radial pieces, or to the arms, do we see anything to sustain the generally accepted distinction of two genera in this group; for, if we make the radial series, for instance, a basis of classification, we would have, as may be seen by glancing at the 5th and 6th columns of the foregoing table, to place *Taxocrinus nuntius*, without anals or interradials, not only along with *Forbesiocrinus spinifer*, with its single range of interradials, but with *F. Agassizi*, with its thirty to forty anals, and twenty-five to thirty interradials. The same method would also place a variety of *F. Meeki* with seven interradials in the same group with *Taxocrinus juvenis*, Hall, with its single range of interradial pieces.

Now from these facts, it must be evident, we think, that if *Forbesiocrinus* is to be retained as a distinct genus from *Taxocrinus*, it will have to be separated upon some characters or differences not yet observed. Hence, although we shall continue to use the two names, for the sake of convenience, ranging under *Taxocrinus* species without interradial or anal pieces, as well as those with one or two of each; and under *Forbesiocrinus*, those with a greater number of these pieces, we shall do so—at least until better evidences of their being distinct genera have been adduced—with the understanding that we

regard the latter group as a section or subgenus under the old name *Tazocrinus*. In this sense, then, we leave under the names *Forbesiocrinus*, our *F. Monroensis* and *T. Norwoodi*, as well as all those mentioned in the foregoing list from No. 12 to 22 inclusive. Our *F.?* *semiovatus*, however, seems to be a typical *Tazocrinus*, and its name should be written *Tazocrinus semiovatus*. The species *Forbesiocrinus nuntius*, *F. Thiemei*, *F. communis*, *F. Kellogi*, *F. spinifer*, and *F. juvenis*, of Hall, we regard as likewise typical forms of *Tazocrinus*, and hence their names should be written *Tazocrinus nuntius*, *T. thiemei*, *T. communis*, *T. Kellogi*, *T. spinifer*, and *T. juvenis*.

#### TAXOCRINUS GRACILIS, Meek and Worthen.

Body small, expanding moderately from the base. Basal pieces small, and looking like the last joint of the column divided into three pieces; subradial pieces so small and narrow as to allow the lower middle extremity of the first radials to come nearly, or in some instances, quite down upon the basal pieces; four of them triangular and more or less wedge-shaped so as to project up between the first radials as much as half the length of the latter; the fifth one larger than the others, but slightly tapering, and truncated above by the anal piece, so as to present a quadrangular or subpentagonal outline. First radial pieces considerably larger than the subradial, of nearly equal length and breadth, or a little wider than long, hexagonal in form, the inferior sloping, and upper horizontal sides much longer than the others. Second radials, in four of the rays, shorter than the first, wider than long, and generally hexagonal; in the fifth ray of the specimen under investigation, the second piece has its right margin enormously, and perhaps abnormally, developed, and extended obliquely upwards, so as to fill the whole interradial space above the comparatively minute interradial piece, quite up as far as the second bifurcation of the rays, with one solid plate. In the ray containing this singularly developed second piece, there are two other primary radial pieces succeeding it, of near the natural size and form, upon the last (fourth) one of which the first bifurcation takes place; after this each of the divisions bifurcates again on the fourth piece, and the two inner subdivisions again on the fourth piece, while the two outer ones send off subdivisions, one on the sixth, and one on the seventh piece. In the ray immediately to the right of that just described, and apparently the anterior one, no division takes place until upon the eighth piece, all the pieces between the second and eighth being transversely oblong or about twice as wide as long, and gradually diminishing in size. In the other three rays, the first division takes place on the third piece, and the second and third divisions also on the third piece, the arms rather rapidly diminishing in size with each bifurcation.

Interradial pieces very small, rather longer than wide, somewhat wedge-shaped above, and resting between the short superior lateral sloping sides of the first radials, and supporting on each superior sloping side a short truncated margin of the contiguous second radials, which generally meet over the little interradial, so as to isolate it from the free space above, though not always. Anal piece a little larger than the interradials, hexagonal in form, and resting with one short side upon a truncated upper side of the largest subradial; while it connects on the right with a first and second primary radial, and on the left with a second and third primary radial, and one first secondary radial.

Surface of body apparently smooth, but showing granules on some of the divisions of arms. Patelliform accessory pieces not developed between the primary radial pieces, but quite distinct between some of the secondary. Column, as in other species of the group, round and tapering downwards from the base, near which it is composed of very thin pieces.

This species, although somewhat like *T. intercapularis*, Hall, (Iowa Report,

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pl. 1, f. 3.) from the same locality, will be at once distinguished by its more spreading rays, greater interradial and interbranchial spaces, and particularly by its proportionally smaller and shorter interradial pieces, as well as by having the latter resting upon the superior lateral truncated sides of the first radials, instead of upon one of the second, while it has no interaxillary pieces as seen in *T. interscapularis*. It likewise shows some differences in the bifurcations of its arms, after the first division.

A marked feature in the specimen from which the description was made out, is the extraordinary development of the right margin of one of the second primary radial pieces, by which it is made to fill the entire adjacent interradial space. This, however, as already stated, is probably abnormal.

*Locality and position.* New Buffalo, Iowa. Hamilton division of the Devonian.

Descriptions of new species of URINOIDEA, &c., from the Palaeozoic rocks of Illinois and some of the adjoining States.

BY F. B. MEEK AND A. H. WORTHEN.

RADIATA.

ECHINODERMATA.

CYSTIDEA.

Genus COMAROCYSTITES, Billings, 1854.

*Comarocystites*, Billings, Canadian Journal, vol. ii. p. 269, 1854; Report Geol. Survey Canada, p. 288, 1856; Decade iii. Canadian Organic Remains, p. 61, 1859.

"Body ovate, the smaller extremity being the base; pelvis small, of three plates, above which are from eight to eleven irregular rows of plates, mostly hexagonal; mouth near the summit provided with a valvular apparatus; arms free, grooved, and composed of a single series of joints bearing pinnulae; ambulacral orifice in the apex between the arms; column round and smooth. The plates of the only species that has been collected present, in some conditions of preservation, a peculiar vesicular structure of their exterior surfaces, while sometimes they are solid and smooth."

"Generic name *Comaron*, a strawberry."

*COMAROCYSTITES SHUMARDI*, M. & W.

Body obovate, the summit being more broadly rounded than the lower extremity; height about one-tenth greater than the breadth. Basal pieces wider than long, irregularly heptagonal and octagonal, extending out horizontally from the column, and having, at two of the sutures, small supplementary pieces wedged in between, so as to come nearly in contact with the end of the column. Succeeding ranges of plates above, five, very irregularly arranged, and differing in size and form, but increasing in diameter from below upwards, mostly hexagonal or heptagonal in form; all deeply concave on the outside, with prominent sharp carinae at the sutures; when these angular prominences are weathered or worn, slit-like pores are seen passing through the sutures, which they cross at right angles, being partly common to each of the contiguous plates. Height, 1.50 inch; breadth, 1.30 inch; greatest breadth of one of the plates next to upper range, 0.44 inch. Arms and openings of the summit unknown.

This species is nearly allied to *C. punctatus*, Billings, the type of the genus, from which it may be distinguished by having only five ranges of plates above the base, instead of seven or eight, as well as by the greater size of the plates [1865.]

near the summit, some of which measure as much as three times the diameter of those of the corresponding pieces in the Canadian species of equal size. It is true these are probably, to some degree, variable characters in this genus, but not, we should think, to the extent exhibited between the Canadian species and our specimens, in which latter they are constant. Again, where the sutures of our species have been worn so as to expose the perforations, they are seen to be less crowded, and not so numerous as in *C. punctatus*, while none of the plates, even where apparently perfectly preserved, show any traces of surface striae.

The deep concavity of the external surface of the plates in this genus, and the sharply carinated character of the sutures between, together with the irregularity in the size, form and arrangement of the plates, give a very peculiar appearance to the fossil, that might, at a first glance, cause it to be mistaken for a coral. When only found in the condition of detached plates, they present a singular appearance, well calculated to mislead even an experienced palæontologist who had not seen the entire fossil, or enough of the plates united, to show their true characters. The fact that they are all deeply concave, and when unworn, smooth on the outside, while the inner side is convex and strongly rayed, would naturally lead to the conclusion that the outside is the inner side, and *vice versa*. When a few of the plates are found united, however, it is at once seen that the deep concavity is on the outside, and the convexity and rays within. These rays extend one from the prominent middle of each plate to each of its sides, where they connect with those coming from the middle of the adjacent plates. When three or four of the united plates are placed with the inside upwards, the spaces between the rays are seen to present the form of deep, triangular pyramidal cavities, the apex of each cavity terminating at the meeting of the corners of each three of the contiguous plates. The rays are as prominent as the convex centres of the plates, and quite narrow or linear within, but widen rapidly towards the outside of the plates. They are also each split longitudinally into parallel laminae by a series of profound slits extending nearly to the outer surface of the plates, and it is these slits that are seen, like pores, at the prominent angular sutures, where the edges of the plates at the latter have been worn partly away. It is difficult to understand the use of these deep slits, or divisions of the internal rays, since, as noticed by Mr. Billings, they seem never to pass entirely through the plates, excepting where the prominent edges of the latter have been worn away.

Named in honor of Dr. B. F. Shumard, of St. Louis, whose labors in western geology and palæontology are well known.

*Locality and position.*—Cape Girardeau, Missouri. Trenton division of Lower Silurian.

COMAROCYSTITES SHUMARDI, var. OBOCONICUS, M. & W.

A single specimen in the collection from the same locality and position as the species just described, differs in being obconical instead of obovate, its lower half tapering downwards gradually to the column. Its basal plates also rise nearly vertically from the column, instead of extending out horizontally as in the typical form of *C. Shumardi*. It has a part of the column attached, showing it to be very nearly cylindrical, and composed of thin plates. In form this specimen agrees nearly with Mr. Billings' figure 2, plate 5, decade iii., Geol. Survey of Canada, from which it differs in having only five ranges of plates above the base. It also agrees with the species we have just described, in having its plates above the middle proportionally larger, one of these plates in a specimen only 0.72 inch in height, measuring nearly a third more in diameter than those of Mr. Billings' species near 1.50 inches in height.

It is quite probable this form may belong to a distinct species, but as we

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are not clearly satisfied that this is the case, we merely call attention to it as a variety of *C. Shumardi*.

*Locality and position, same as last.*

### CRINOIDEA.

Genus POROCRINUS, Billings, 1856.

*Porocrinus*, Billings, Report Geol. Survey of Canada, 1856, p. 279; Canadian Org. Rem. 1859, Decade iv., p. 33.

*Generic formula.*—Basal plates 5.      Proper interradials 0.  
Subradials 5.      Anals 2.  
Radials 1 × 5.

“Cup conical; basal plates five, pentagonal; subradials five, three hexagonal and two heptagonal; primary radials five; one large azygos interradial supported on the truncated summit of the anterior subradial, and one small one, situated over the suture between the anterior subradials, and having above it on one side the large azygos, and on the other the left anterior primary radial; several small pectinated rhombs similar to those of the *Cystidea*.” [Billings].

As remarked by Mr. Billings, this genus has the structure, so far as the form and arrangement of the plates forming the base and lateral walls of the cup are concerned, of *Poteroocrinus* and *Cyathocrinus*; from both of which it differs in the important character of having pectinated openings analogous to those of the *Cystidea*.

Our specimens of the following described species also show that this interesting type also presents another character in common with some of the *Cystidea*—that is, the possession of several large rounded, non-pectinated openings above. Of these openings there are three, one on the anal side, and two on the anterior side. They are all nearly on the same horizon as the bases of the free arms, though the anal opening is a little lower than the other two.

So it would seem this genus presents, as it were, a combination of the characters of the *Crinoidea* and *Cystidea*. With the regularity of structure and arrangement of parts of a true *Crinoid*, it has the pectinated and other openings of a *Cystidean*. It differs, however, from the *Cystidea* in having the pectinated openings located at the junction of the corners of the plates, instead of passing through them near one of the sides, while the little bars protecting these openings are arranged obliquely, instead of at right angles to the margins of the plates, as in the *Cystidea*.

Our species also shows that the conical form of the cup is not a generic character.

#### POROCRINUS CRASSUS, M. & W.

Body subovoid or a little higher than wide. Base depressed, rather widely truncated below, pentagonal in outline, two and a half to three times as wide as high, with a comparatively large pentagonal central perforation; basal pieces wider than long, pentagonal in outline. Subradial pieces twice to three times as large as the basal, about as high as wide, three hexagonal, and two on the anal side heptagonal. First radial pieces of about the same size as the subradials, apparently all irregularly heptagonal, each with, near its upper extremity, a small outward sloping subcordate, or oval, flattened surface for the articulation of the second (first free) radial piece; four of them with each one, and the fifth with two, of the superior lateral margins deeply sinuous and forming in part the margins of the large rounded openings of the summit. Anal pieces two; the first smaller than the other, quadrangular in form, resting between the superior sloping sides of two of the subradials, and supporting, on its right upper sloping edge, one side of one of the first radials, and on its left one of the oblique sides of the second anal piece.

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Second anal oblique, wider (obliquely) than its diameter in the direction of its vertical axis, irregularly pentagonal, resting with its base upon the upper truncated side of one of the subradials, and its left side against one of the first radials; while its upper right margin connects with another, and its sinuous oblique superior side forms the under margin of the anal opening. Pectinated areas situated in deep excavations, those at the angles of the basal and subradial pieces largest, and obscurely trilobate; the smaller ones at the angles above oval or subcircular. Surface ornamented with strong radiating costæ extending from the centre to each of the sides of the plates, and all widening from the centre outwards. Sutures distinctly furrowed, even on the truncated under side of the base.

Length 0.72 inch; breadth about 0.66 inch.

This species will be at once distinguished from *P. conicus*, of Billings, the typical species of the genus, by its oval instead of obconic form, (being widest a little below the arms, and rounded in above), and the strong radiating costæ of its plates. We know of no other form with which it need be compared.

Like the typical species, its free arms commenced with the second radial, and were evidently slender, and nearly cylindrical, or a little compressed laterally, and provided with a very small furrow above. We have not seen the column, but it appears to have been large at its connection with the base.

Nor have we been able to see the structure of the small crown occupying the narrow space within the area surrounded by the arms, but it seems to consist of about three or four comparatively large plates.

*Locality and position.* Oswego, Kendall Co., Ill. Cincinnati Group,\* Lower Silurian System.

#### POBOCRINUS PENTAGONIUS, M. & W.

Body pentagonal-obovoid, being more or less rounded above, and tapering at an angle of about sixty degrees from the middle of the prominent subradials to the summit of the column; base forming about one-fifth of the entire height, and having the form of an expanding pentagonal basin, with flattened sides; basal pieces pentagonal, and nearly twice as wide as high. Subradial pieces as long as wide, and equalling nearly half the length of the body.—the only one visible on all sides in our specimens, hexagonal in form; each prominent in the middle, from which point a well-defined ridge radiates so as to connect with similar ridges on each of the surrounding plates; the ridges passing laterally and upwards intersect the sides of the plates, but the one passing downwards from the middle of each subradial coincides with its central inferior angle, where it connects with a corresponding ridge extending up the sutures between the basal pieces; the arrangement of the ridges being such as to divide the surface into a series of large triangular, slightly concave areas, in which are placed the pectinated openings. These openings at the corners of the basal and subradial pieces consist of about twelve of the linear fissures to each plate; those at the junction of the plates above smaller, with a proportionally smaller number of fissures. Form and arrangement of the anal and radial pieces, as well as of the arms, unknown.

Surface finely granulo-striate, the granules being ranged in lines parallel to the ridges, particularly on the ridges below the middle of the subradials, so as to present, as seen under a good magnifier, a finely substriated appearance.

Column rounded, and expanding rapidly upwards near the base, where it is composed of very thin segments with minutely crenated edges; farther down the segments are proportionally thicker and more coarsely crenate.

Length of body, 0.43 inch; breadth at the middle of the subradials, 0.40 inch. Breadth of column at its connection with the base, 0.15 inch; do. 0.72 inch below, 0.05 inch.

\* See Note at the end of this paper.

This species will be readily distinguished from *P. conicus*, of Billings, by its broader, more ovoid, and more angular form, owing to the much greater prominence of its subradial pieces, and particularly by the well-defined ridges radiating from the centre of the plates. In the latter character, it approaches more nearly the last described species, *P. crassus*, from which it differs in a marked degree, in having its under side below the middle of the subradial pieces greatly more tapering, and base much smaller, and not wider than the head of the column, as well as proportionally higher. It also differs in having its greatest breadth at the middle of the subradial pieces, which are much more prominent; while its pectinated openings are not sunken, nor its sutures furrowed as in the last.

*Locality and position.*—Trenton Limestone, of Lower Silurian; Dixon, Ill.

### Genus HETEROCRINUS, Hall, 1847.

#### HETEROCRINUS CRASSUS, M. & W.

Body robust, but rather small compared with the arms and column, wider above than the length from the base to the summit of the first radials; distinctly truncated at its connection with the column, from which point the sides expand rather distinctly upwards; subpentagonal in outline as seen from below. Basal pieces pentagonal, wider than long, and all excavated or indented on the outside at the superior angle and down the middle. First radial pieces longer than the basal, about three-fourths as long as wide, broadly truncated above, and regularly pentagonal in form, excepting two on the anal side, which appear to each have one of the superior lateral angles a little truncated for the reception of a small anal piece; all deeply indented at their inferior lateral angles, so as to leave a broad, rounded, undefined ridge or prominence descending from the middle to the basal pieces. Succeeding radial pieces forming free arms, nearly as wide as, but much shorter than, the first; in four of the rays all transversely oblong, and about three or four times as wide as long, excepting the fourth or fifth pieces, which is pentagonal, and supports, on its sloping upper side, the first divisions. In one ray on the anal side the second piece is pentagonal, larger than that of any of the others, and gives off a lateral branch from its short sloping side on the left,\* above which the other pieces present the same size and form seen in the other rays.

Arms after the first division on last radial, bifurcating again on the sixth or seventh piece, after which they are known to divide again in one arm, on the sixth piece, which is as far as our specimens show the structure.

Surface usually appearing smooth, but sometimes showing traces of scattering granules. Column comparatively large, distinctly pentagonal, and expanding upwards near the base of the body, where it is composed of irregularly alternating thicker and thinner segments; central perforation small and round.

Height of body from base to the summit of first radial pieces, 0.35 inch; breadth at summit of first radials, about 0.67 inch; length of five succeeding radial pieces, 0.46 inch; breadth of do. about 0.15 inch. Breadth of column at its connection with the base, 0.32 inch.

This is perhaps the largest and most robust species of the genus known. It is composed of thick, strong plates, and the indentations or excavations at the points where the superior angle of each basal plate connects with the inferior lateral angles of the first radials, together with the more shallow depressions extending down from these points to the lower margin of the basal pieces, give a pentagonal outline to the body—the five angles being coincident with those of the column.

\* From some of the specimens it appears somewhat doubtful whether this may not be a range of anal pieces, instead of a branch of the arm.

*Locality and position.*—Cincinnati Group of the Lower Silurian series; Kendall Co., Illinois.

**HETEROCRINUS SUBCRASSUS, M. & W.**

This species agrees so nearly with the last in most of its characters as to render a detailed description unnecessary. It will be readily distinguished, however, by its smaller size, as well as its less robust appearance, and the different aspect of its arms. This latter difference consists in the more slender appearance of all the divisions, and particularly in the joints of which they are composed having their upper margins projecting beyond the base of each succeeding piece above, so as to present a kind of upward imbricating appearance and roughness, not seen in the arms of *H. crassus*.

As in the last, its rays bifurcate first on the fifth and sixth pieces, and one of them gives off a branch (?) on the left side of the second radial, above which it bifurcates regularly on the sixth piece. After the first regular division on the last radial piece, some of the arms are seen to divide again on the fourth, others on the fifth, and others on the sixth pieces, after which one division is known to bifurcate on the sixth piece, and still again on the thirteenth.

Breadth of body at the summit of the first radial pieces, 0.27-inch; height of do., 0.13 inch; length of rays from top of first radial pieces to the first bifurcation, 0.21 inch; entire length of arms from first division to extremities, about 1.50 inches. Breadth of column at its connection with the base, 0.15 inch.

*Locality and position.*—Cincinnati, Ohio. Cincinnati Group of Lower Silurian.

**HETEROCRINUS? INCURVUS, M. & W.**

**Subgenus *Anomalocrinus*, M. & W.**

Body expanding rapidly from the base to the summit of the first and second radial pieces, where it is more than twice as wide as high; composed of the five basal, five first radial, and two second radial pieces. Basal pieces pentagonal, of moderate size, wider than long, and forming together a low rapidly-expanding, pentagonal cup. First radial pieces in three of the rays from three to five times as large as the basal pieces, wider than long, two hexagonal and one heptagonal,—all with their superior lateral angles strongly incurved between the arms, and each with a small protuberant, rounded facet above, for the reception of the small succeeding radials. In the remaining two rays, the first pieces are smaller and lower than those of the others, and each pentagonal in form, with the upper side horizontally truncated its entire breadth, for the reception of a larger second radial, which in these two rays agrees in size and form, as well as in being included as a part of the walls of the body, with the large first pieces of the other rays. Succeeding radials not more than one-third as wide as those included in the walls of the cup, and forming small, rounded, widely separated free arms, consisting of one to three quadrangular and one pentagonal pieces to each ray. Arms above the first bifurcation on the second or third pentagonal free radial, in two of the rays seen, bifurcating again on the third piece, and, in one instance, sending off nearly at right angles from the second piece after the first division, a strong tentacle, or small lateral branch.

First anal piece pentagonal, longer than wide, and resting between the left sloping side of a large second primary radial and the right sloping side of a first primary radial, with rather less than half its length projecting above the former, and without extending down so as to bring its base in contact with any of the other plates below. In the individual examined, this piece is strongly incurved, and supports on its inner truncated end an oblong, narrow second anal, which in its turn supports a smaller third piece, all of which are arranged in a right line, and probably form one side of a proboscis.

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Surface smooth, or only with traces of fine granules. Sutures a little concave. Column comparatively strong and rounded near the base, where it is composed of short joints, and marked with obscure, regular longitudinal striae.

Height of body on the anal side, 0.28 inch; do. on the opposite side, 0.22 inch; greatest breadth above (allowing for a slight accidental compression) about 0.38 inch; breadth of free arms at their connection with the body, 0.08 inch; breadth of column at its connection with the base, 0.16 inch.

This species presents points of analogy both to *Heterocrinus*, Hall, and *Hybocrinus*, Billings, and yet seems to differ from both to such an extent, that if we could be sure some of its peculiarities are not abnormal in our specimen, we would be inclined to view it as the type of a new genus. As we have seen but the one specimen, however, which is not complete in all its parts, we have concluded to place it, for the present at least, as the type of a subgenus under *Heterocrinus*. It differs from the typical species of that genus in having the column round instead of pentagonal, and in having only the first primary radial pieces in three of the rays, and two in each of the others, included as a part of the walls of the body; while its preceding primary radials are very narrow, and form small, rounded, distantly separated arms, instead of being nearly as wide as those soldered in the walls of the cup. Another peculiarity is the strongly incurved superior lateral angles of the large radial pieces around the margin of the cup between the arms.

In the rather unsymmetrical form of the body, the slender proportions of the free arms, and its general aspect, it resembles *Hybocrinus*, from which it differs in having but one anal piece connected with the walls of the cup, and in having two of the rays and two of the primary pieces included in the wall, while its free arms bifurcate twice or oftener, instead of being simple from their origin.

*Locality and position.*—Cincinnati, Ohio. Cincinnati Group of Lower Silurian.

#### Genus ERISOCRINUS, M. & W.

*Erisocrinus*, M. & W., Am. Jour. Sci. xxix. p. 174, March, 1865.

*Philocrinus*, M. & W., ib., May, 1865; not Koninok, 1863.

#### Generic formula.

Basal pieces, 5	} united to form the walls of the body.
Subradials, 5	
Radials, 2 × 5	
Anals and interradials, 0.	

Soon after publishing the description of this genus, we were led by its similarity to a genus described by Prof. Koninok, from the Carboniferous rocks of India, to believe it identical, and ranged our species under that name. Later comparisons have caused us, however, to doubt the correctness of this conclusion. If there is no mistake in regard to *Philocrinus* being without a range of subradial pieces, then the two types would be clearly distinct. The fact, however, that the basal pieces in *Erisocrinus* are small, and might be easily overlooked in imperfect specimens, taken in connection with the fact that the lowest range of pieces represented in Prof. Koninok's figure, if true basals, would have to present a singularly elongated cuneiform outline, leads us to suspect there may be another range of small true basal pieces below them, but not visible, from some imperfection in the specimen in Prof. Koninok's type. If so, then the identity of our Crinoid with our Indian type would be complete. Until this question can be satisfactorily settled, however, we have concluded to retain our name *Erisocrinus* for the American type. Should they prove identical, however, of course Prof. Koninok's name will have to take precedence, since it has priority of date.

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**ERISOCRINUS CONOIDEUS, M. & W.**

Body small, below the summit of the first radials obconic, nearly twice as wide as high; basal pieces a little wider than long, pentagonal as seen projecting beyond the column, and forming together a small low cup with diverging sides; subradials near three times as large as the basal pieces, a little wider than long, and all hexagonal; first radial pieces half as long as wide, about twice as large as the subradials, and all broadly truncated on the same horizontal plane above, for the reception of the second radial pieces. Surface smooth; sutures linear, not impressed; plates not convex. Column and all the parts above the first radial pieces unknown.

Height to summit of first radials, 0.20 inch; breadth of do. 0.34 inch.

This species will be at once distinguished from young specimens of the last of its own size, by its obconic, instead of basin-shaped cup. From Prof. Koninck's species *cometa* (in case our species should really belong to his genus) it will be distinguished specifically by the less convex outline of the sloping under sides of its cup, as well as by its shorter and proportionally wide first radial pieces. It will of course have to take the name *Philocrinus conoideus*, in case Prof. Koninck's species should prove generically identical with these American forms.

*Locality and position.*—Springfield, Ill., Coal Measures,

**ERISOCRINUS TUBERCULATUS, M. & W.**

Although we only know this fine species from its detached plates, these agree so exactly in form with the corresponding parts of our *Erisocrinus typus* from the same beds, that scarcely a doubt can be entertained in regard to their belonging to the same genus; while they differ so remarkably in their surface characters as to be distinguished at a glance, specifically, from that or any other Crinoid known in our Coal Measures. This difference consists in their entire external surface being covered with regularly disposed, narrow, prominent tubercles, instead of being smooth.

Of these tubercles there are, on a first radial plate measuring 0.90 inch in breadth and 0.54 inch in height, about thirty in number, arranged so as to form two rows of about eight each, ranging parallel to the inferior sloping margins, and one row of about eight along the superior margin. Between this latter row and those below, there are usually a few tubercles either isolated or forming a third transverse row. There is likewise usually one or several others at the lower middle angle outside of the regular rows. This arrangement of the tubercles into rows is not, however, always obvious at a first glance, but a tendency to such a disposition can always be seen.

On the second radials the tubercles are arranged in a single row along the lower and each superior sloping margin, with one or more in the middle between the rows. In the articulating, or connecting surfaces of the radial plates, we observe no differences between these pieces and those of the corresponding parts of *E. typus*.

Some of the plates indicate a transverse diameter of 1.40 inch for the entire body.

If our proposed genus *Erisocrinus* is, as we have suspected, identical with *Philocrinus* of Koninck, the name of this species will have to be written *Philocrinus tuberculatus*.

*Locality and position.* Upper Coal Measures. Sugar Creek, Sangamon Co., Ill., and near Brighton, Jersey Co.

**Genus CYATHOCRINUS, Miller, 1821.****CYATHOCRINUS QUINQUELOBUS, M. & W.**

Body broad basin-shaped, composed of very thick, strong plates; height to [Aug.

summit of first radial pieces, less than half the width. Base small, a little concave below, or forming a nearly flat pentagonal disk; basal pieces about half hidden by the column—the portion of each exposed pentagonal in form. Subradial pieces much larger than the basal, four of them hexagonal, and one on the anal side heptagonal; each having a strongly elevated, bicarinate protuberance, extending out horizontally almost its entire length, like the rays of a star, upon which the body rests when placed with the under side down. First radial pieces two and a half to three times as wide as high, pentagonal, and all transversely truncate their entire breadth above, for the reception of the succeeding radials, so as to present a broad, moderately concave, outward sloping facet above; those of the two antero-lateral rays each nearly twice as long as the others, and provided near the middle of the upper margin with two angular nodes or prominences; sutures close fitting, and not very apparent. First anal piece small, quadrangular, a little wider than high; resting upon the truncated upper side of one of the subradials, and connecting on each side with a first radial, above which it does not project.

Columnar facet of moderate size, a little concave, with a rather small, rounded, central perforation, and traces of radiating striae around the margin. Surface finely and regularly granulose.

Height to summit of first radial pieces, 0.55 inch; greater transverse diameter, at summit of first radials, 1.01 inches.

This species is evidently allied to *C. sculptilis*\* of Hall, from the Burlington limestone; but it is much more robust, and has more prominent subradial pieces, with the prominences more grooved along the middle. Its base is also more concave, and its first radial pieces, particularly the anterior and posterolateral, proportionately shorter; while it shows no tendency to develop ridges across from the subradials to first radials, nor has it any surface striae.

*Locality and position.*—Warsaw, Ill. Keokuk division of subcarboniferous series.

#### CYATHOCRINUS SUBTUMIDUS, M. & W.

Body below the summit of the first radial pieces, cup-shaped, robust, rather deep, somewhat rounded below, with nearly vertical sides. Basal pieces well developed, pentagonal, convex, about as wide as long. Subradials four or five times as large as the basal pieces, thick, and very strongly convex, slightly higher than wide, four hexagonal and one apparently heptagonal. First radial plates about the size of the subradials, having a general pentagonal outline, with the two superior lateral angles usually a little truncated, apparently by the first series of the vault pieces—not tumid, like the plates below; each with a moderately concave outward-sloping facet for the reception of the next radial above. Succeeding primary radials (of which one ray shows two, and another three,) about half as wide as the first radial pieces, all rounded on the back, two in one ray, and one in another, transversely oblong; the last one in each of these rays proportionally a little larger than the others, and supporting on its superior sloping sides the arms, which, in the anterior ray, bifurcate again on the second piece. (Number and arrangement of the anal pieces unknown.)

Breadth of body, 0.90 inch; height of body to summit of first radials, 0.72 inch.

This species has the general aspect of *Cyathocrinus bullatus* and *C. protuberans*, Hall, (Iowa Report, 624 and 626,) but differs from both in having its

\* We now regard our *C. scitulus* (Proceed. Acad. Nat. Sci., Phila., Sept., 1860, p. 393,) as a synonym of *C. sculptilis*, Hall. Our description was going through the press when we first saw Prof. Hall's Supplement to the Iowa Report, in which he described his *C. sculptilis*, and, owing to the necessary haste with which our comparisons had to be made, and the fact that Prof. Hall had inadvertently described one of the subradial pieces of his species as the first anal piece, and the first anal as the second, caused us to overlook their probable identity.

basal pieces proportionally much larger and more tumid, and its radials above the first narrower and proportionally longer. From *C. protuberans* it also differs in not having its first radial pieces tumid, while one of its arms after the first division is seen to bifurcate again on the third piece, instead of merely giving off small lateral branches, as in *C. protuberans*.

Our specimen being defective on the anal side, we have been unable to determine whether it has one only, or two anal pieces soldered in the wall of the cup, though it appears to have but one.

*Locality and position*:—Keokuk limestone, of subcarboniferous series. Near White Hall, Green County, Ill.

CYATHOCRINUS ENORMIS, M. & W.

*Poteriocrinus? enormis*, M. & W. Proceed. Acad. Nat. Sci., June, 1861, p. 137.

Although this species possesses the structure and arrangement of the parts composing the walls of the body, including the anal pieces, of *Poteriocrinus*, the fact that it has a slender lateral proboscis, not larger than one of its arms, instead of a large trunk nearly as wide as the body, as seen in typical species of *Poteriocrinus*, leads us to the conclusion that it more properly belongs to the allied group of *Cyathocrinus*. This conclusion is also sustained by the appearance of an opening in the summit, near the small lateral proboscis. These differences in the structure of the summit will probably be found of more importance as a distinction between these two groups, than the fact of one or two more or less anal pieces being included as a portion of the walls of the body.

Genus POTERIOCRINUS, Miller, 1821.

POTERIOCRINUS (ZEACRINUS) CARBONARIUS, M. & W.

*Poteriocrinus (Scarphiocrinus?) carbonarius*, M. & W. Proceed. Acad. Nat. Sci., June, 1861, p. 140.

This species has the elongated and constricted second radial pieces, as well as the gaping sutures between these and the first radials, characterizing *Scarphiocrinus*, but differs from the typical forms of that group in having a concave base. In the latter, as well as some of its other characters, it agrees with *Zeacrinus*, to which it seems to more properly belong.

Genus ACTINOCRINUS, Miller, 1821.

ACTINOCRINUS PISTILLUS, M. & W.

Body, exclusive of the proboscis, sub-pyriform; the sides rising nearly vertically from the base to the summit of the first radial pieces; thence gradually expanding to the secondary radials, after which they expand very rapidly, so as to cause the brachial pieces to be directed horizontally outwards, or nearly so, at about the middle of the body. Above the horizon of the arm bases, the dome rises at first vertically, but very soon rounds inward, and rises with a moderately convex slope to the base of the subcentral proboscis. Base truncated and flat below, with a thick dilated margin notched at the suture, so as to present a trilobate outline, as seen from beneath; columnar facet a little concave, and about one-third as wide as the base. Basal pieces twice as wide as high, and hexagonal in form, the inferior margin being much longer than any of the others. First radial pieces wider than long, smaller than the basal: three of them heptagonal, and two hexagonal. Second radial pieces very small, twice as wide as high, and transversely oblong, or sometimes with one of the superior lateral angles truncated by one of the interradials, so as to present an irregular pentagonal form.

Third radials a little larger than the second, pentagonal or hexagonal in form, and supporting on each superior sloping side, a secondary radial piece,

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each one of which is succeeded by another. Upon the superior sloping sides of the latter, in the anterior and one of the lateral rays, commence the brachial pieces, of which there are two ranges, upon the last of which commence the free arms, thus giving origin to four arms in each of these rays. In the two posterior rays, however, and one of the lateral, after the second bifurcation on the last secondary radial, the latter supports on the outer sloping side a tertiary radial, which gives origin to two brachial pieces, making five arms to each of these rays, or twenty-three to the whole series.

After the first bifurcation on the third radial pieces, all the succeeding pieces of each ray are in direct contact, so as to leave no spaces for interaxillary plates: while the outer brachial pieces of each two contiguous rays connect over the anal and interrarial spaces, so as to nearly or quite isolate the pieces filling those spaces, from the dome.

First anal piece of the same form as the subradials, but rather smaller than those of the anterior and antero-lateral rays; surmounted by three smaller hexagonal and heptagonal pieces in the second range, and three or four in the third, making seven or eight altogether. Interrarial pieces four, (rarely five,) those of the inferior range being larger than the others.

Surface without costæ or visible granules, but roughened by the tubercular character of the plates. The tubercle occupying each first radial and the first anal, is larger than those on any of the other pieces of the side walls above; where they become smaller and less distinct with each succeeding range, until they are nearly or quite obsolete a few ranges below the arms. Upon the dome, however, the tubercles are prominent and well defined. The proboscis is unknown, but its base is stout, and rises rather abruptly from the dome, being placed nearly its own breadth nearer the anal than the opposite side.

The arms are also unknown. They evidently projected at first horizontally outwards from the body, and their bases are so crowded as to form an almost continuous rim around the body.

Height from base to horizon of arm openings, about 0.64 inch; height to base of proboscis, 1.22 inches. Breadth of dilated margin of base, 0.46 inch; breadth of same just above, 0.38; breadth of body at top of first radials, 0.55 inch; breadth of same at arm openings, 1.05 inches; breadth of base of proboscis, 0.43 inch.

This species belongs to a peculiar group of *Actinocrinus*, as generally understood in this country, of which *A. pyriformis*, Shumard, (Missouri Report, pl. A, figs. 6a, b,) may be regarded as the type. It also includes our *A. pistilliformis*,\* and *A. clavigerus*, Hall. These species differ remarkably in form from typical species of *Actinocrinus*, such as *A. triacontadactylus*, *A. laevis*, &c., of the old world, in having the body very narrow and attenuate below the arms, so as to form, as it were, a kind of handle to the upper half, giving the whole, when the arms and proboscis are removed, somewhat the form and appearance of a pestle. They also differ from the old world species regarded as typical forms of *Actinocrinus*, in having the arms springing from the body in a continuous series, instead of being in five groups. Should it be considered desirable to separate this little group as a section of *Actinocrinus*, it may be called *Uperocrinus*, from its resemblance, when the arms and proboscis are removed, to a short-handled pestle. If Casseday's group *Batocrinus*, however, should be adopted as a distinct genus from *Actinocrinus*, this should be ranged under it as a subgenus.

Specifically, the form under consideration differs from *A. pyriformis* in having its first anal, first radial, and basal pieces, proportionally much shorter, its base more flattened below, and more dilated around the margin;

\* In indicating this form under the name *A. rudis*, (Proc. Acad. Nat. Sci., June, 1861, p. 131,) we had overlooked the fact of that name having been used by Prof. Hall for another species, in the Supplement of the Iowa Report, p. 28; hence we now propose to call it *A. pistilliformis*.

as well as in the plates of the lower part of its body being much more distinctly tubercular, and in the greater number and more crowded arrangement of its arms, which were evidently, at their bases, directed outwards, instead of being, from their origin, directed obliquely upwards.

From our *A. pistilliformis*, with which it agrees more nearly in some respects, it differs, not only in having three more arms, but in the less abruptly contracted form of its body immediately below the arms, as well as in having from four to six interradial pieces to each space, instead of only two or three. There were doubtless other more important differences that would be apparent on comparing perfect specimens of each, judging from the different geological positions of these two forms.

*Locality and position.*—Burlington limestone, of subcarboniferous series, Burlington, Iowa.

Subgenus SPHÆROCRINUS, M. & W.

ACTINOCRINUS (SPHÆROCRINUS) CONCAVUS, M. & W.

*Actinocrinus (Amphorocrinus) concavus*, M. & W. Proceed. Acad. Nat. Sci., Phila., June, 1861, p. 132.

This curious little species may be regarded as the type of a section of the group *Actinocrinus*, as usually understood, for which we would propose the name *Sphærocrinus*. Its peculiarities consist in the deep convexity of the base, and the tumid and curved character of its first radial and first anal pieces. These characters are so marked, that when placed with the under side down, it rests directly upon a broad base formed of the first radial and first anal pieces, which curve under to connect with the sunken basal pieces, and upwards to form a part of the vertical walls of the cup. In the lateral position of its anal and oral opening, it agrees with *Agarricocrinus* and *Amphorocrinus*; but it differs from the first, with which it also agrees in being concave below, in the tumid and curved character of its first radial and anal pieces, as well as in having the succeeding radials, anals, and interradials forming a vertical wall, instead of extending out on a horizontal plane, while its arms are very much weaker, and rise from around the summit, instead of from the horizon of the lower part of the body. Its interradial and second range of anal pieces are also much shorter.

From *Amphorocrinus*, it not only differs in the concavity of its base and the curved character of its first radial and first anal pieces, but in all the other peculiarities of form, and the weakness and position of its arms.

From *Dulatocrinus*, Lyon, (*Cacabocrinus*, Troost?) with which it agrees in form, the number of basal pieces, and the sunken condition of its base, as well as in the incurved character of its first radials, it differs in having its first anal piece down on the same range with the first radials, and connecting with the base as in the typical forms of *Actinocrinus*, instead of being up on a range with the first interradials. It also differs in its lateral anal and oral opening, as well as in not having protuberant arm bases.

MOLLUSCA.

CEPHALOPODA.

GONIAITITES COMPACTUS.

Shell subdiscoid; umbilicus wide, or about twice the dorso-ventral diameter of the last turn near the aperture, moderately deep, and showing about half of each inner turn. Volutions four, near twice as wide as their diameter in the direction of the plane of the shell, broadly rounded externally, and each provided with a broad moderately deep concavity on the inner side, for the reception of the next whorl within; sides rather narrowly rounded near the umbilicus, and rounding off more gradually to the periphery, the most

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prominent part being within the middle. Aperture (as inferred from sections of the whorls) transversely subreniform. Septa with a single pointed lobe on each side; dorsal lobe infundibuliform, the narrow portion being lanceolate; dorsal saddle broadly and very obtusely rounded; superior lateral lobe from one-fourth to one-third larger than the dorsal, and having much the same shape, excepting that it is proportionally wider; inferior lateral lobe consisting merely of a broad rounded sinuosity. (Surface unknown.)

Should Montfort's name *Aganides* be retained for this genus, the name of this species would become *Aganides compactus*.

Greatest diameter 2.50 inches; convexity (or breadth of aperture) 1.33 inch; breadth of umbilicus, about 1.12 inch.

*Locality and position.*—Coal Measures. Maconpin Co., Ill.

*Note in regard to the name "CINCINNATI GROUP," used in the foregoing paper.*

As it is now acknowledged that the rocks along the Hudson river valley, to which the name Hudson River Group had been applied, belong, as long maintained by Dr. Emmons, to a different horizon from the so-called Hudson River rocks of western New York, and the states farther westward, it seems to be an awkward misnomer to continue to apply the name Hudson River Group to these western deposits. Hence it is certainly desirable that this group should receive some appropriate and generally applicable name. Its subdivisions, it is true, have already received various lithological names, such as "Utica Slate," "Frankfort Slate," "Lorraine Shale," &c.; but as each of these names will probably be always directly associated, in the minds of geologists, with the particular subdivision to which it was originally applied, while neither of them is applicable to the lithological characters of the whole series, we cannot, without creating confusion, so extend its signification. It has recently been proposed to designate this series as the "Green and Blue Shales and Limestones;" this, however, is not a name, but descriptive phrase, and has the disadvantage of being based upon lithological characters not everywhere characteristic of these beds.

In view of all the facts, we have concluded to propose the name Cincinnati Group—which will be adopted in the forthcoming reports of the Illinois Geological Survey—for this series. This name possesses the advantage of being equally applicable to rocks of any color or composition, while it carries the mind to a well-known locality, where the formation referred to is extensively developed, and its fossils so abundant that they have been thence widely distributed, both in this country and Europe. Consequently, geologists will everywhere at once understand to what particular horizon of the Lower Silurian this name refers.

Descriptions of New Crinoidæ, &c., from the Carboniferous Rocks of Illinois and some of the adjoining States.

BY F. B. MEEK AND A. H. WORTHEN.

Genus POTERIOCRINUS, Miller, 1821.

POTERIOCRINUS INDIANENSIS, M. & W.

Body rather deeply cup-shaped or truncato-obconic. Base basin-shaped, comparatively rather broadly truncated below by the columnar facet. Basal pieces well developed, pentagonal, about one-third wider than high. Subradials large, three pentagonal, and two on the anal side hexagonal, there being no defined angle at the middle of the under side of any of these plates. First radial pieces about half as large as the subradials, wider than long, rounded on the outside, and nearly pentagonal, or with one or both of the superior

1865.]

lateral angles slightly truncated, so as to give an obscurely hexagonal or heptagonal outline; all broadly truncated nearly their entire breadth above, and one on the immediate right of the anal series, resting in part directly upon the upper truncated side of one of the subradials, and elevated almost its entire length above the horizon of those of the other rays. In this latter ray, and the one on the immediate left of the anal series, the second piece is quadrangular, and wider than long, while the third is pentagonal, and supports the first division of the arms on its superior sloping sides. These divisions in the ray on the right are simple, rounded, and each composed of a single series of somewhat wedge-shaped pieces; while the left branch of the one on the left of the anal series, bifurcates again on the second piece, making three arms in this ray, which are constructed like those already described, and continue simple as far as they can be traced. In the only other ray preserved in the specimen, the bifurcation takes place on the second radial, beyond which the arms continue simple.

First anal piece nearly as large as one of the first radials, hexagonal, and resting between the upper sloping sides of two of the subradials, partly under the first radial on the right, while it connects on the left with the second anal, and supports a third on its truncated upper side. Second anal piece rather large, longer than wide, hexagonal, and resting upon the superior truncated side of one of the subradials. Third anal piece smaller than the others, hexagonal, and surmounted by several other hexagonal pieces in direct succession, belonging to the proboscis.

Surface apparently smooth. Columnar facet rather large and marked with distinct radiating striæ around the margins.

Length of body to summit of first radials, about 0.48, excepting in the ray on the immediate left of the anal series, where it is 0.58 inch; breadth about 0.56 inch. Breadth of columnar facet, 0.26 inch. Usual diameter of the arms after the bifurcations, 0.12 inch.

*Locality and position.*—Crawfordsville, Indiana. Keokuk division of the Subcarboniferous series.

*POTERIOCRINUS (SCAPHIOCRINUS) TENUIDACTYLUS, M. & W.*

Body in comparison with the length of the arms small, inversely campanulate below the summit of the first radial pieces; being narrowly rounded below and rather expanded above, where the breadth is nearly twice the height. Base less than half as wide as high, basin-shaped, the sides rounding under to the columnar facet, which is of medium size and a little concave. Basal pieces well developed, pentagonal, and wider than long. Subradial pieces twice or three times as large as the basal; those on the anterior side (the only ones seen) hexagonal. First radials wider but shorter than the subradials; transversely truncated about three-fourths their entire breadth above, for the reception of the succeeding radial pieces; those on the anterior side curving a little outwards and having an irregular pentagonal outline, the superior lateral angles being more or less truncated, or rounding inwards. Second radials pentagonal, nearly as long as wide, separated by interradial pieces of nearly their own breadth, rounded and constricted around the middle, with the central superior angle prominent, and the sloping margins on each side of it supporting the arms.

Anal pieces unknown. Arms long, slender, and in two of the anterior rays known to bifurcate on the tenth piece above the third primary radials, after which they are seen to be extended to a considerable length, without showing distinctly another division, though there is some appearance of such bifurcation in one of the branches, on the twentieth piece. Immediately after the division of the rays on the third primary radials, the arms are rounded and composed of wedge-shaped pieces, wider than long, and alternately thicker and thinner on opposite sides, each one supporting at its larger end a stout

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tentacle. Above the bifurcation on the tenth piece, the divisions are very long, slender, somewhat angular on the outer side, and still composed of a single series of wedge-shaped pieces, each one of which is strongly protuberant laterally, for the reception of a tentacle at its larger end,—the protuberances and the sinuosities between giving the divisions of the arms a zigzag appearance, somewhat like those of *Platycrinus nodobrachiatus*, Hall.\*

Surface apparently smooth, or only finely granulose. Suture not impressed between the plates of the body, but somewhat gaping between the first and second radials.

Height of body to top of first radials, 0.41 inch; breadth, 0.60 inch. Length of arms to first bifurcation, 0.70 inch; entire length nearly 3 inches.

This species seems to be related to several of those described by Prof. Hall from the same locality and position, but on comparison will be found not to agree in all its characters with the description of any of them. From his *S. spinobrachiatus* it evidently differs in not having the plates of the body convex, nor the sutures indented at their angles, as well as in not having the arms subspinous, and the whole body is less broadly cup-shaped.

From *S. Whitei*, Hall, it differs in not having the "surface of cup marked by deeply impressed pits" at the junction of the sides of the subradials, and between the first radial pieces: and from *S. Halli*, Hall, it differs in not having the arms simple after the first division on the second primary radial, as well as in some of the details of their divisions.

*Locality and position.*—Burlington, Iowa. Burlington Limestone of Sub-carboniferous series.

#### POTERIOCRINUS (SCAPHIOCRINUS) BAYENSIS, M. & W.

Body of medium size, rather depressed obconic below the top of the first radials. Base about twice as wide as high, expanding directly from the head of the column on a line with the subradial and first radial pieces. Basal pieces moderately developed, wider than long, pentagonal, and showing the whole surface of each in a side view. Subradials about three times as large as the basal, somewhat wider than long, three hexagonal, and two on the anal side apparently heptagonal, the angle on the middle of the under side of all being very obtuse. First radial pieces wider and a little shorter than the subradials, all pentagonal, apparently transversely truncated their entire breadth above. Second radials of nearly the same size as the first, and like them pentagonal, but having the middle angle above and more salient, while the two superior sloping sides each supports an arm, thus giving origin to two arms to each ray, or ten to the entire series; all of which are nearly in contact all around below, excepting on the anal side.

First anal piece smaller than the subradials, hexagonal in form, and resting between the upper sloping sides of two of the subradials, with its upper right edge supporting one side of one of the first radials, and its left connecting apparently with a second anal piece, the form of which cannot be made out in our specimen. In the third range, one piece evidently rested upon the upper truncated edge of the first anal piece, but its form and connection with the other pieces on the left have not been determined.

Arms long, and, as far as can be determined, apparently simple after the first division of each ray on the second radial piece; each composed of a single series of wedge-shaped pieces, alternately longer and shorter on opposite sides, but not protuberant on either side; those near the lower part about as long on the longer side as their breadth. Tentacles numerous, rather stout, and composed of joints three or four times as long as wide, and not swollen or dilated at the ends.

Column of moderate thickness near the base, where it is round and com-

\*Iowa Report, p. 542.

posed of alternately thicker and thinner pieces. Surface apparently smooth. Sutures slightly furrowed excepting those between the first and second radial pieces, which are distinctly gaping when the arms are folded together.

Height of body to the top of the first radial pieces, 0.25 inch; breadth of do. 0.48 inch. Length of arms above the second radials, 1.90 inches or more; diameter of column at its connection with the base, 0.13 inch.

This species seems to be closely related to *S. decabrachiatus*, Hall, (Iowa Report, p. 679, pl. xxv. fig. 1,) but is larger and more robust, and its second radial pieces differ materially in form, being nearly or quite twice as wide as long, while in *S. decabrachiatus* they are "nearly once and a half as long as wide." Its basal pieces are also proportionally about twice as large. Other differences would doubtless be apparent, if we had the means of comparing all the corresponding parts of each with those of the other.

*Locality and position.*—Bay City, Pope Co., Illinois. Chester division of the Subcarboniferous limestone series.

*POTERIOCRINUS (SCAPHIOCRINUS)?* NORWOODI, M. & W.

Body small, depressed basin-shaped, rounded and concave below, breadth three times as great as the height to summit of first radial pieces. Basal pieces very small, deeply impressed within the concavity of the under side, and almost entirely hidden by the column. Subradial pieces comparatively well developed, curving under to connect with the concave base; three pentagonal, (exclusive of the scarcely-defined angle at the middle below,) and two on the anal side hexagonal. First radial pieces short, and about twice as wide as high, pentagonal, with the upper side transversely truncated its entire breadth. Second radials as wide as the first, and twice as long, pentagonal, and at the middle above acutely angular. Arms after the first division on the second radial bifurcating at least once more, on the third or fourth piece, the joints beyond being slightly longer than wide, and supporting alternately on opposite sides of the arms strong, long-jointed, rather remotely-separated tentacles. First anal piece nearly as large as one of the subradials, pentagonal, and resting between the upper sloping sides of two of the subradials, with its right superior sloping side supporting the left under side of a first radial, and its left upper side a third anal piece, while its short left vertical side connects with the second anal piece. Second anal about the size of the first, and resting upon the short upper truncated side of one of the subradials, with its left side connecting with one of the first radials, and its right with another anal piece. Above these several other anal pieces are seen to rise so as to form apparently a narrow, rounded, lateral proboscis, on a range with the arms, which it appears to scarcely exceed in thickness. Summit and column unknown.

Surface nearly or quite smooth, excepting an angular ridge or carina, which extends up each second radial its entire length. Sutures distinct and indented a little at the connections of the corners of the first radials and the subradial pieces; that between the first and second anal pieces gaping.

Height to summit of first radial pieces, 0.05 inch; breadth, 0.15 inch.

This little species presents rather a combination of characters belonging to several groups. In the number and arrangement of its anal pieces forming a part of the walls, as well as in the general structure of its body, it agrees with *Poteriocrinus*, and its depressed form and round deeply-concave underside are characters belonging to the group *Zecrinus*, while the form of its arms, and the distinctly gaping character of the sutures between its first and second radial pieces, suggest relations to *Scaphiocrinus*. Its apparently distinctly lateral, slender, rounded proboscis, however, would remove it entirely from the genus *Poteriocrinus* to *Cyathocrinus*. Indeed if we could be sure the latter character is real, and not produced by the accidental folding together into a cylindrical form of merely a part of the external wall of the large trunk so characteristic of the genus *Poteriocrinus*, we would not hesitate to call

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it *Cyathocrinus Norwoodi*, since the absence of the large trunk-like summit, and the presence of a slender lateral proboscis, are characters probably of more importance, than the presence of a few more anal pieces and the differences in the form of the body.

Named in honor of Prof. J. G. Norwood, of the University of Missouri.

*Locality and position.*—Hancock Co., Illinois. St. Louis division of the Subcarboniferous series.

POTERIOCRINUS (SCAPHIOCRINUS) SUBTUMIDUS, M. & W.

Body basin-shaped below the summit of the first radial pieces, three times as wide as high, composed of thick tumid plates. Basal plates very small, deeply impressed, and hidden by the column. Subradials comparatively large, very convex, and extending out nearly horizontally, but curving upward at their outer extremities; about as long as wide, three of them subhexagonal, and two subheptagonal, the angle at the basal or inner side being nearly obsolete. First radials convex, about twice as large as the subradials, half as high as wide, regularly pentagonal, and all nearly evenly truncated above, their entire breadth. Anal plates like the others, tumid; first one one half to one-third as large as the subradials, irregularly pentagonal, and resting obliquely beneath one side of a first radial, between the upper sloping sides of two subradials, while its left and upper side connect with the other anals. Second anal piece resting upon the truncated upper side of one of the subradials, and connecting on the left with a first radial, above which it projects nearly half its length. Third anal piece hexagonal, supported upon a short truncated upper side of the first anal, and connecting on the left with the second, and on the right with a first radial, above which it projects a little.

Second radials and parts above unknown. Surface smooth; sutures strongly defined, in consequence of the tumid character of the body plates.

Height of body to summit of first radial pieces, 0.27 inch; breadth of do. 0.73 inch; breadth of base, 0.13 inch.

Until specimens of this species can be examined, showing the structure of the parts yet unknown, it will be difficult to determine whether its name should not be more properly *Zeacrinus subtumidus*, or whether it may not belong to another group, of which *Graphiocrinus 14-brachialis*, of Lyon, is the type.\*

This latter form differs widely, not only from *Poteriocrinus* proper, but from *Scaphiocrinus*, *Zeacrinus*, and also from *Graphiocrinus*, in having its arms composed each of a double series of interlocking pieces, as well as in its unusually massive tumid plates and general physiognomy. In some families of the Orinoidea, such for instance as the *Platycrinus* group, a difference like this in the structure of the arms may be of less importance, but in that including *Poteriocrinus* and the allied genera, we believe it to be of more significance, if not indeed of generic value, especially when accompanied by the other differences of habit presented in this instance. Hence we would propose for this group the name *Eupachycrinus*, with *Eupachycrinus 14-brachialis* = (*Graphiocrinus 14-brachialis*, Lyon) as the type. It will also doubtless include *E. pentalobus* = (*Cyathocrinus? pentalobus*, Hall,) and possibly also *Scaphiocrinus orbicularis*, Hall.

Should our species here under consideration prove to have its arms constructed of a double series of pieces, we should unhesitatingly call it *Eupachycrinus subtumidus*, since in the massive tumid character of its body pieces, small sunken base, and general form and appearance, it agrees, so far as its parts are known, essentially with the type of that group. Specifically, however, it will be readily distinguished by its subradial pieces being proportionally smaller and so much less protuberant as to give a different outline to the under side of the body, as seen in a side view. It also differs entirely in the form and arrangement of its anal pieces.

*Locality and position.*—Bay City, Pope Co., Illinois. Chester division of the Subcarboniferous series.

\* See Kentucky Geological Report, vol. III. p. 477, pl. I. figs. 2 and 2a.

Genus *CYATHOCRINUS*, Miller, 1821.*CYATHOCRINUS ARBOREUS*, M. & W.

Body rather under medium size, conoidal-semiovate below the top of the first radial pieces, about as wide as high. Basal pieces well developed, forming a low basin-shaped cup; all pentagonal, and about as long as wide, the greatest breadth being slightly above the middle. Subradial pieces three or four times as large as the basal, about as long as wide, usually arcuate, or a little concave on the outside along the lateral margins—four hexagonal and one heptagonal. First radial pieces of near the same size as the subradials, and presenting a more or less nearly pentagonal outline; facet for the reception of the second radials nearly equalling one-third the breadth of the first radial pieces, slightly protuberant, and sloping outwards. Succeeding radials small, rounded on the outside, and varying from two to five in the different rays; there being but two in one of the posterior rays and five in the other, while the anterior ray has four, one of the antero-lateral three, and the other four,—all excepting the last or axillary piece being quadrangular.

After the first division into two arms on the fourth primary radial piece, (at least in one of the antero-lateral rays,) another division immediately takes place on the first piece of each principal branch, and of the four branchlets thus formed, the inner two ascend directly upwards, and each bifurcates again on the second piece, and the subdivisions each again on the third piece; while the two main lateral branchlets spread out on either side, each giving off above two or more subordinate branchlets, the first of which is seen to bifurcate at least once. The whole of the divisions and subdivisions being thus spread out so as to resemble the trained limbs of a tree spread upon a wall. The divisions of the other rays cannot be traced out in the specimen examined, in the same detail, but some of them appear to divide much in the same way, and others somewhat differently.

All the arms and their divisions are rounded, and the smaller divisions composed of joints that are longer than wide, while no tentacles have been observed connected with any of them.

The first anal piece is quadrangular, a little longer than one of the basal pieces, and rests directly upon the superior truncated side of one of the subradials, while it connects on each side with one of the large first radial pieces, above which it does not project. Other anal pieces unknown.

The sutures are slightly impressed, and the surface nearly smooth, or only obscurely granulose. The column and summit are unknown.

Height to summit of first radial pieces, 0.66 inch, on the anal side, and 0.55 inch on the other; breadth at top of first radial pieces, 0.53 inch; breadth of second and succeeding primary radial pieces, 0.15 inch.

*Locality and position.*—Crawfordsville, Indiana. Keokuk division of Sub-carboniferous series.

Genus *PLATYORINUS*, Miller, 1821.

As first proposed by Miller, this genus was badly defined, and it is manifest that its author himself, had no very clear ideas of its limits, since he also included in it species of *Pentremites*, Say, *Dichocrinus*, Munster, and of his own genus *Actinocrinus*. Later writers, however, have restricted it within far more natural limits, and, as now generally understood, Miller's first species, *P. laevis*, seems to be regarded as the typical form of the genus. In this and the closely allied species, the body is more or less hemispherical below the arms, while the dome terminates above in a long, generally slender, central or subcentral proboscis, closed at the summit, but apparently pierced by a small aperture on one side near the upper extremity. In these typical forms the arms bifurcate once or oftener near the body, beyond which they are simple, and composed at first, of a single series of wedge-shape pieces, passing more or less gradually

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into a double series of small interlocking pieces supporting numerous tentacles. Other species, however, generally included in the genus, have no proboscis, but a simple aperture in the summit, located either laterally, or nearly centrally; while some of these have the arms composed of a double series of interlocking pieces, and others of a single series of wedge-shaped pieces,\* neither of these peculiarities in the structure of the arms being always especially coincident with apparently any one of the other characters mentioned.

As defined by Koninck and Le Hon†, in accordance with their improved nomenclature of the parts, the structural formula of this group is as follows:—

Basal pieces, 3; forming a wide cup.

Radials, 2; one large and one small,  $\times 5$ .‡

Anal, 1 large, or 3 small.

Interradials, 1,  $\times 4$ .

Arms, 10, 20, 25, 30 or 35, according to the species.

From the foregoing remarks, it will be seen, that the group including species agreeing with the above formula, may be divided, as (in part) suggested by the Messrs. Austin,§ into the following four sections:—

1. *Platycrinus*, (typical).—With the summit terminating in a more or less elongated, central, or subcentral proboscis, bearing the opening on one side near the upper extremity.

Type. *P. lævis*, Miller. Also includes *P. spinosus*, and *P. 30-dactylus*, Austria; *P. Müllerianus*, Koninck; and *P. granulatus*, Miller.

2. *Centrocrinus*, Austin.—Opening of summit nearly or quite central, but not elevated upon a proboscis.

Type. *P. [Centrocr.] gigas*, Gilbertson.

3. *Cupellæocrinus*, Troost.—Differs from the last only in having its second radial pieces merely rudimentary, or so small as to allow the first brachials to rest partly upon the first radials.

Type. *P. Tennesseeensis*, Roemer.

4. *Pleurocrinus*, Austin.—Differs from *Centrocrinus* only in having the opening of the summit lateral, and nearly or quite on a line with the arm bases

Examples.—*P. [Pleurocr.] mucronatus*, Austin; *P. [Pleurocr.] tuberculatus*, Miller; *P. [Pleurocr.] tuberosus*, and *P. [Pleurocr.] subspinosus*, Hall; *P. [Pleurocr.] asper*, Meek & Worthen, &c., &c.

In regard to the value and importance of the characters distinguishing these sections, Palæontologists will probably always differ. Hitherto these differences have scarcely been noticed, even by the most respectable authorities, excepting as one of the means of distinguishing species. From all analogy, however, it seems reasonable to suppose that they were accompanied by corresponding modifications in the structure of the softer parts of the animal. It will also be observed, that they correspond, in part, almost exactly to the characters distinguishing sections of the allied *Actinoecrinus* group. For instance the species embraced in the section *Pleurocrinus*, differ from the typical forms of *Platycrinus*, almost precisely as *Agaricocrinus* and *Amphoracrinus* do from the

\**P. nodobrachiatus*, Hall, is an American example with the arms composed of a single series of pieces. We allude here to a species described under that name by Prof. Hall, in the Iowa Report, p. 542, 1858, and not to another form described by him under the same name, in his "Descriptions of New Species of Crinoides, &c." Albany, Feb. 25, 1851, p. 17. The inconvenience and confusion liable to result from the use of the same specific name for two forms of the same genus, makes it necessary that another name should be applied to one of these species; hence we would propose to call that described at the latter date, *P. perasper*.

†Recherches Sur les Crinoides du Terrain Carbonifère de Le Belgique, p. 155, 1854.

‡It is worthy of note that although Koninck and Le Hon give two radials (one large and one small) as the number, that their figure 1 a, pl. vi. of *P. lævis*, Miller, shows clearly 3 radials, one large and two small. As others figure and describe it as having only two, this may be only an accidental variety. It will be seen, however, that our *P. parvulus*, described on another page of this paper, has 3 radials, one large and two small. Still two seems to be the normal number in this genus.

§ Monograph of Recent and Fossil Crinoides, p. 6.

typical species of *Actinocrinus*. Hence, if we admit these latter groups, either as genera or subgenera, consistency at least, if not indeed a philosophical system of classification, would require that equal prominence should be given to these corresponding sections of the *Platycrinus* group. Whatever theoretical views may be entertained on this subject, however, the practical difficulty of ascertaining the nature of the summit, and the position of the aperture in palaeozoic crinoids, will prevent the general distribution of the species into groups, upon characters of this kind, unless a more profound study of great collections of the remains of these animals, may yet bring to light some coincident, but more easily observed characters, in the structure of the body, or other parts.

*PLATYCRINUS NIOTENSIS*, M. and W.

Body below the summit of the first radial pieces cup-shaped, wider than high; sides slightly ventricose above the base. Base basin-shaped, several times as wide as high, moderately expanding, rather broadly truncated below, its lower margins projecting slightly downwards around the end of the column, and provided with three very small projections, one at the lower extremity of each of its sutures. First radial plates large, higher than wide, widening slightly from below upwards, subquadrangular or with the superior lateral angles a little truncated by the interradial pieces; each with a concave facet for the reception of the second radials, equalling about half its breadth above, and excavated near one-fourth its length on the outer side, below the upper margin. Second radial pieces trigonal, very small, or scarcely filling the facet or excavation in the upper side of the first radials; rounded below, with each superior sloping side supporting secondary radials, on the second of which another bifurcation takes place, making four arms to each ray.

Arms after the second division described above, simple, and at first composed each of a single series of wedge-shaped plates, but soon passing into a double series of small interlocking pieces, supporting on each side of the arms closely arranged series of long-jointed tentacles.

Column near the base compressed and tortuous, being composed of alternately thicker and thinner elliptic pieces, with a very minute central perforation.

Surface somewhat granulose; sutures not grooved, nor distinctly apparent; those between the basal pieces indicated by a faint linear ridge.

Height to summit of first radials, 0.36 inch; breadth about 0.40 inch. Greater diameter of column at base of body, 0.12 inch; smaller do. 0.09. Breadth of one of the arms, 0.06 inch; length of do. apparently an inch or more.

In its general appearance, this species is not unlike *P. sarca* of Hall, (Iowa Report, p. 673, pl. 18, fig. 4), though it is much smaller, has a proportionally much shorter base, and also differs in having but four, instead of six arms to each ray.

*Locality and position.*—Niota, Hancock County, Illinois. Keokuk division of Subcarboniferous Limestone.

*PLATYCRINUS HEMISPHERICUS*, M. and W.

Body rather above medium size, hemispherical, being rounded below, and about twice as wide as high; base broad basin-shaped, and forming about one third the entire height of the cup, with a pentagonal outline as seen from below; columnar facet between one-third, and one-fourth the diameter of the base, and subelliptical in outline. First radial pieces larger than the basal, wider than high, nearly quadrangular, and widening moderately from below upwards; facet for the reception of the second radial one third as wide as the summit, and extending down about one fourth the length of the plates,—concave and sloping outwards, with a deep notch within. Second radial pieces very small, but filling the cavity in each of the first radials, from which they

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extend out nearly horizontally—pentagonal in outline, and each supporting on its superior lateral sloping margins the first divisions of the arms, which are comparatively small and bifurcate again on the second piece; beyond this the two outer divisions remain simple, but the two inner divide again on the second piece, making six arms to each ray, or thirty to the entire series. Arms after the last divisions long, slender, cylindrical, and composed at first of a simple series of quadrangular pieces, but passing gradually upwards into interlocking triangular pieces, and still farther up forming a double series of small alternating cuneiform pieces, supporting closely arranged, long-jointed tentacles. Anal, interradial, and vault pieces unknown. Sutures, excepting between the basal pieces, distinctly, but not widely or deeply channeled.

Surface ornamented with rather small, but well defined, prominent nodes. On the base, these nodes are arranged in ten rows, five of which radiate from the columnar facet, one to each of the corners; while those between each of these form intermediate radiating rows, consisting at first of a single range, but becoming a double or triple range near the margin, when the three sometimes coalesce laterally. On the first radial pieces two rows pass from just beneath the facet for the reception of the second radials, to each of the inferior lateral angles, while between these there is, at first, a single node, but farther down two or three rows, consisting of nodes which show a disposition to elongate, or coalesce laterally, so as to form little transverse ridges. Above, there is also a row extending horizontally to each superior lateral angle, with a few less regularly arranged nodes on the sides below these. A single transversely elongated node sometimes also occurs on the little radials, and one less distinctly defined also sometimes on each of the pieces between this and the next bifurcation.

Breadth of body at summit of first radial pieces, 1.07 inches; height of do. 0.60 inch; breadth of base 0.67 inch; breadth of second radial pieces at the summit, 0.54 inch; do. of second radials, 0.19 inch.

From the description, it will be seen this species is rather closely related to *P. granulatus* of Miller, which it nearly resembles in form and general appearance. It is a larger and more robust species, however, and differs, not only in the arrangement of the pustules on the base into distinct radiating rows, but according to Austin's figures and description (*Monogr.*, Recent and fossil Crinoidea, p. 33, pl. 3, f. 2,) in having but six instead of seven arms to each ray, as well as in having the arms above the middle composed of a double series of small wedge-shaped pieces, instead of consisting of a single series throughout. From its analogy to *P. granulatus*, of Miller, it will probably be found to possess, like that species, a long subcentral proboscis.

*Locality and position.*—Crawfordsville, Indiana. Keokuk division of Sub-carboniferous Series.

#### PLATYORINUS PARVULUS, M. and W.

\* Body very small, short subcylindrical, or deeply cup-shaped. Base depressed basin-shaped, or several times as wide as high, columnar facet about one third as wide as the base, with a small marginal rim. First radial plates nearly oblong, being longer than wide, with nearly parallel sides; some of them with two obscure linear ridges extending from the middle of the upper side, and slightly diverging to the base; each moderately concave above for the reception of the next range of pieces. Second radial pieces very minute, about twice as wide as long, but not equalling the breadth of the slight concavity in the upper side of the first radials. Third radial pieces, slightly wider than the second, and about of the same length, pentagonal, and each supporting an arm on each superior sloping side. Arms each dividing on the second piece beyond which they are simple, at least for four or five pieces above, and composed of a single series of quadrangular pieces, about as long as wide, excepting the first, which is near twice as long as wide. Tentacles apparently 1865.]

comparatively stout. Column near the base nearly or quite round, and composed of very thin pieces. Surface smooth.

Length of body to summit of first radial pieces 0.12 inch; breadth of body 0.12 inch. Length of arm about 0.30 inch; thickness of column, 0.02 inch.

This very small species, differs remarkably from all the others with which we are acquainted, resembling it in other respects, not only in its small size, but in having two minute radial pieces in each ray, above the larger first radial piece, making three radials to each ray.

*Locality and position.*—Pope County, Illinois. Chester division of Subcarboniferous Series.

Genus ACTINOCRINUS, Miller, 1821.

Subgenus ALLOPROSALLOCRINUS, Lyon & Casseday, 1860.

ACTINOCRINUS (ALLOPROSALLOCRINUS) EUCONUS, M. & W.

Body having the form of the subgenus remarkably well developed, being perfectly flat or slightly concave below the arm bases, and regularly conical above, where it terminates in a rather slender central proboscis. Base very small, with a round, deep, conical depression, for the reception of the column, occupying almost its entire area, and surrounded by a narrow, slightly projecting ring-like margin. Radial, interradial, anal and first brachial pieces, all extending out horizontally from the base. First radial pieces hexagonal and about twice as wide as long. Second radials transversely oblong, and rather smaller than the first. Third radials a little larger than the second, pentagonal or hexagonal in form, and each supporting on its superior (more properly outer) sloping sides two slightly larger secondary radials, each of which is succeeded by another, and the latter each by two brachial pieces, making four arms to each of two rays seen, or twenty to the entire series, if the others have the same number. First interradial pieces larger than any of the radials, heptagonal or octagonal, and supporting two smaller pieces in the next range, beyond which are two others, making altogether five pieces in the only interradial area we have been able to make out clearly. Anal pieces unknown.

Vault regularly conical, with slightly convex slopes, and armed around the middle with two or three rows of irregularly disposed, short, conical spines, or spine-like tubercles. Proboscis slender and apparently not inclined to either side.

Surface smooth, or indistinctly granulose; sutures very close fitting and difficult to see. Arm bases forming an almost continuous series (being but very slightly interrupted at the anal and interradial spaces) around the base of the abruptly truncated conical body. Column unknown.

Height to base of proboscis, about 0.70 inch; breadth, 1.13 inches.

This species is remarkable for its conical form, being almost perfectly flat, or a little concave below the horizon of the arm bases, and rising with slightly convex slopes above, to the base of the proboscis. Hence the whole of the cavity occupied by the viscera of the animal corresponds to the dome only of species of the usual form of *Actinocrinus*. For the group to which it belongs, Messrs. Lyon & Casseday proposed the name *Alloprosallocrinus* in 1860, and Dr. Troost had proposed for it the name *Conocrinus*, in a list published without a description in 1850.

Since the above was in type, a more careful comparison with Lyon & Casseday's description of their *A. conicus* leads us to suspect that our crinoid may be identical with their species. Still we do not feel satisfied that this is the case, particularly as they describe the columnar facet as involving the basal and part of the surrounding range of pieces; while it is very small in our crinoid, not even covering the small basal pieces. In addition to this, our specimens seem to show the bases of a more numerous series of arms.

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*Locality and position.*—Six miles southeast of Anna, Union Co., Illinois; from the St. Louis division of the Subcarboniferous series. Collected by Mr. Henry Engelmann.

**PENTREMITES (GRANATOCRINUS?) GRANULOSUS, M. & W.**

Body small, subglobose, base deeply concave, particularly in the middle, and not visible in a side view. Radial plates a little longer than wide, about two-thirds as long as the entire body, and tapering from above to the base, each divided by the narrow pseudo-ambulacral areas, down almost to the very base; lateral margins moderately prominent. Interradial pieces subtrigonal, or with a fourth obscure angle in the middle below; longer than wide, and each narrowing from below to the summit, where they are perforated by two minute openings. Anal piece of the same size and form as the interradial, with its opening circular, and comparatively large, its outer margin being protected by a small, rather pointed node. Pseudo-ambulacral areas narrow, or sublinear, rather impressed, and each with a distinct longitudinal, linear, mesial furrow; pore pieces from twenty-five to thirty. Surface marked by comparatively distinct granules, most strongly defined on the interradial and anal pieces, where they sometimes show a tendency to arrange themselves in transverse lines parallel to the lower margin.

Height of body, 0.22 inch; breadth of do. 0.23 inch. Breadth of pseudo-ambulacral areas, 0.05 inch.

Not having at hand a specimen or figure of the type of Troost's *Granatocrinus*, we are not quite sure this form belongs to that group, though we have no doubt in regard to the propriety of separating such species from the typical forms of *Pentremites*. Our species has somewhat the general form and appearance of *P. Roemeri* of Shumard, (Missouri Report, pl. b, figs. 2a, 2b, 2c and 2d,) but differs too widely to render a detailed comparison necessary.

*Locality and position.*—Keokuk division of Subcarboniferous series, near Warsaw, Illinois.

**POLYZOA.**

**Genus ETRACTINOPORA, M. & W.**

**ETRACTINOPORA RADIATA, M. & W.**

The interesting fossil upon which we propose to found this genus and species is entirely silicified, and, as seen from below, presents the form of a regular eight-rayed star, the rays being slender, and nearly equalling in length the diameter of the nucleus. In a side view, however, it is seen to be regularly rounded in outline below, while the slender rays are observed to be produced upwards in the form of thin vertical laminae, which converge to the centre over the nucleus. The specimen is not in a condition to show whether or not there is a central axis extending all the way up, but there probably is. The rays are thickest below, and taper gradually upwards on their outer margins, which are beveled or carinated all the way down to where they meet at the middle of the under side. Within, they each pass abruptly into a thin lamina, which is poriferous on both sides, and extends to the middle over the nucleus.

The pores are circular, with a slightly prominent margin, and regularly disposed nearly in quincunx, at intervals about equalling their own diameter, or sometimes less. They only exist in the thin portion of each ray, while the thicker outer and inferior portions seem to be nearly or quite solid.

We are not able to determine satisfactorily whether this was a free or an attached Bryozoon; but if attached, the stem or point of attachment was probably very small.

Greatest transverse diameter to the extremity of the rays, 0.90 inch; do. of nucleus between the rays, 0.35 inch; thickness of the outer margin of each ray near the nucleus, 0.10 inch; diameter of pores about 0.02 inch.

1865.]

*Locality and position.*—The only specimen of this fossil we have seen is in a granular mass of decomposing chert, containing some fragments of small crinoid columns. It was obtained from the Subcarboniferous rocks of Missouri, but the exact locality and position we have been unable to ascertain.

Note on the genus *GILBERTSOCRINUS*, Phillips.

BY F. B. MEEK.

Genus *GILBERTSOCRINUS*, Phillips, 1836.

*Gilbertsocrinus*, Phillips, Geol. Yorkshire, part ii., p. 207, 1836.

*Goniasteroidocrinus*, Lyon and Casseday, Am. Jour. Sci. xxviii. p. 233, 1859.

*Trematocrinus*, Hall, Sup. Iowa Report, p. 70, 1860.

Phillips' diagnosis of this genus reads as follows:

"Basal joints five, forming a pentagon; suprabasal [subradials] five, hexagonal, forming a decagon with five re-entering angles, from which proceed five heptagonal first costals [first radials] and five hexagonal second costals, [second radials], bearing a pentagonal scapula [third radial] supporting joints [secondary radials] which combine into rounded arms perforated in the centre. First intercostals [first interradians] pentagonal. The following species have been usually referred to *Rhodocrinus*, Miller, from which, it appears to me, they differ entirely." (Phillips.)

He mentions but the following three species, viz., *G. calcaratus*, *G. mammillaris* and *G. bursa*, all from the subcarboniferous. His specific descriptions are very brief and unsatisfactory, but his figures are tolerably good, and give a sufficiently intelligible idea of the generic characters of the group. From these figures, and his description, it is therefore evident that the formula, in accordance with the later improved nomenclature, may be stated as follows:

*Generic formula of Gilbertsocrinus.*

Basal pieces 5.  
Subradials 5.  
Radials  $3 \times 5$ .  
Secondary or supradials 3 or  $4 \times 10$ .  
Anal and interradian pieces 12 to  $15 \times 5$ .  
Pseudo-brachial appendages (arms of some authors) 5, located over the rays.  
Arm-openings (ambulacral,) 10, located directly under the pseudo-brachial appendages.

On comparing this formula with the following, given by Messrs. Lyon and Casseday, of *Goniasteroidocrinus*, cited above, the close relations of these crinoids will be apparent.

*Generic formula of Goniasteroidocrinus.*

Basal pieces  $1 \times 5$ , pentagonal, perforation not visible.  
Subradial pieces 5, hexagonal, nearly equal in size.  
Primary radial pieces  $3 \times 5$ , first spiniferous.  
Secondary radials  $3 \times 10$ , hexagonal.  
Interradian fields [including the anal area]  $5 \times 13$  to 14, [pieces each].  
Interbrachial fields  $5 \times 1$  to 9, [pieces each].

It may be proper to explain that the term pseudo-brachial appendages is used in the formula of *Gilbertsocrinus*, for the parts regarded by Phillips and by Messrs. Lyon and Casseday as arms, and that arm-openings, not alluded to by Phillips in his description, though clearly shown in his figures, are mentioned. These openings were not observed by Lyon and Casseday, because they were hidden in their specimens by the attachment of the small pendulous true arms, or, in the absence of the latter, by portions of the matrix, as is known to the writer from the examination of specimens of their typical species loaned by Mr. Lyon.

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It will therefore be seen that, excepting in mere specific details, these formulas, as far as they go, agree exactly. There is, however, a character which, although not apparent in Messrs. Lyon and Casseday's formula, was nevertheless mentioned in their description, in which the types of these groups differ, that is, in the position of the pseudo-brachial appendages (arms of Phillips and of L. and C.) with relation to the other parts. In *Gilbertocrinus* these appendages are placed directly over the arm-openings and above the inter-brachial spaces, while in *Goniasteroidocrinus* they stand over the interradial spaces.

There may be various opinions in regard to the value of such a difference, but to the writer it seems of not more than subgeneric importance. If these appendages were true arms, or like the arms in other crinoids, designed to support the reproductive organs, ("conceptacula,") little doubt could be entertained in regard to the full generic value of such a difference in their position. The fact, however, that although provided with a central cavity through their entire length, they have nowhere any external openings, being as it were hermetically sealed, is conclusive evidence that they could have performed no such function. Hence it is probable they should be viewed rather as being in some respects analogous to the lateral branches, or verticils, so often given off from the columns of *Platycrinus* and other crinoids. This opinion seems to derive support from the fact that, in some of the typical forms of *Gilbertocrinus*, as well as in American species of *Goniasteroidocrinus*, these appendages, at their origin, consist of a double series of pieces, pierced each through the centre by the only cavity they possess, exactly like the joints of a column, or those of its lateral branches, for which latter they might readily be mistaken, if found detached.

From all the facts it seems probable, therefore, that the only relations these false arms bore to the reproductive system, was that of strong rigid guards thrown off from the margin of the dome, for the protection of the slender, true ova-bearing arms hanging beneath them. Hence, although their existence or absence may be a good generic distinction, their position over the interradial, or interbrachial spaces, can scarcely be regarded as such.

It will probably be remembered that, in a paper read before the Academy by Prof. Worthen and the writer, in September, 1860, and published in the Proceedings for that month, (p. 383), we suggested that a genus proposed by Prof. Hall at about the same time, under the name *Trematocrinus*, was apparently very closely related to *Goniasteroidocrinus*, Lyon and Casseday, 1859, and that we should not be surprised if it would prove to be the same. Having recently had an opportunity, through the politeness of Mr. Lyon, to examine good specimens of the typical species of the latter, the writer is completely satisfied that there is not the slightest generic or even subgeneric difference between the types for which these two names were proposed,\* and as Lyon and Casseday's name has priority, it will have to be retained for the group, whether we regard it as a genus or a subgenus. It is true the later name is shorter and more euphonious, but we have no right for that reason to make it an exception to the generally accepted law of priority. It is surely not greatly more objectionable than *Macrostylocrinus*, Hall, still retained by its author instead of the later name *Cytocrinus*, Roemer.

The following are the American species of this group, viz.: *Gilbertocrinus* (*Goniasteroidocrinus*) *tuberosus*, Lyon and Casseday; *Gilbertocrinus* (*Goniast.*) *facellus*, = *Trematocrinus facellus*, Meek and Worthen; *Gilbertocrinus* (*Goniast.*) *typus*, *G. (Goniast.) tuberculatus*, *G. (Goniast.) papillatus*, *G. (Goniast.) robustus*, and *G. (Goniast.) spinigerus*, = *Trematocrinus typus*, *T. tuberculatus*, *T. papillatus*, *T. robustus* and *T. spinigerus*, Hall.

\* As already stated, it was ascertained from the examination of Mr. Lyon's typical species, that it possesses the same ambilacral openings as the species upon which *Trematocrinus* was founded; and that the slender pendulous "plumose cilia" of Lyon and Casseday (here regarded as true arms) are connected with these openings, as the arms of other paleozoic crinoids connect with the arm openings, excepting that they hang down, instead of ascending.

## Note on a Species of WHALE occurring on the coasts of the United States.

BY E. D. COPE.

As a contribution to the history of the cetaceans of the Atlantic, I desire to give a brief account of the osteological characters of a species of whale-bone whale, the Black Whale of the whalers of our coast.

Individuals are frequently cast ashore Eastward, and some are known to enter New York harbor. They were formerly abundant about the mouth of the Delaware: a letter of Wm. Penn's, dated 1683, states that eleven were taken that year about the capes. Five specimens are stated to have been seen in the Delaware river since that time, and two of great size are recorded to have been found on the coast of Maryland.\* Three have come under my notice, one taken opposite this city three years ago, one cast ashore in Rehoboth Bay, Del., and one in Mobjack Bay, Va.

The first of these, a half grown individual, was taken and exhibited for some time, and its nearly complete skeleton, presented by George Davidson, occupies a prominent place in the Academy's museum, and has afforded the best means of determining the affinities of the species. From an examination it is evident that it is a species of the genus *Eubalaena*, Gray, therefore widely different from the right whale, *Balaena mysticetus*, and congeneric with the *B. australis* and *antipodarum* of the Southern seas. While differing in many points from the first, it is strongly separated from the last two, and has no doubt remained without proper notice up to the present time.

The total length of the specimen, in which all the epiphyses are as yet united, is thirty-one and a half feet; which the presence of the intervertebral cartilages would extend to thirty-seven; of this the head, measured axially, is eight feet five inches, or a little less than one-fourth. This proportion is similar to that of the *australis*. The vertebrae are fifty-six, of which the seven cervicals are all united, the posterior three in the lower part of their centra only; above, they form a solid crest, the atlas and the last attached by the superior part of their neural arches only. The fourth, fifth and sixth cervical diapophyses are distinctly united on one side, while the remainder are separate; on the other side the seventh is united with the three posterior, and the three anterior are united. The first, second and third only have inferior transverse processes. The thirty-first vertebra from the cervicals, or sixteenth from the last rib is the first that encloses the vertical foramen with the diapophysis, and the neural spine is strong on the thirty-seventh. Of the ribs, which appear to have been all preserved, there are fourteen pairs; the anterior are single headed. Of the dorsal vertebrae the first four have slender elongate diapophyses; the anterior zygapophysis is first definitely separated on the tenth. The scapula is 29 inches broad by 23 high.

The outline of the top of the muzzle is much arched; the frontal orbital processes are subtransverse and rather broad. The supraoccipital is more produced anteriorly than represented by Cuvier in the *australis*.† Nasals heavy, nine inches and a half long by three, or distally four inches broad, much as represented for the *B. mysticetus*.‡ with the posterior outline oblique inward, attached by a plicate suture. They are much narrower than in the Leyden *Eubalaena*, which is evidently not the true *australis*, whose skeleton I have studied in the Jardin des Plantes.

In the periotic bones there is much peculiarity discoverable. The specific characters are confirmed by the same portion of a much larger individual from Newport, R. I. The meatus is narrow, occupying nearly the whole length of the bulla, but is nearly closed by the curved marginal anterior process. Its form from below is that of a rounded trapezium, with a deep ante-

\* Watson's Annals of Philadelphia, ii. 428.

† Osseous Fossiles, pl. 226.

‡ Flower P. Z. S. London, 1864, 390.

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rior groove. Anteriorly it is much more obliquely transverse than figured by Cuvier: the posterior process of the periotic is only half as long as the anterior, and the latter is cylindrical acuminate not spatuliform at the extremity. From above, these processes are nearly parallel, while they are very widely divergent, and equal in the *australis*; the interior outline instead of being truncate, has a massive acumination. On the posterior view the anterior process is nearly concealed.

The humerus is short and furnished with a large bicipital process, marking one-third of its length.

The points in which this species differs from the *australis*, as yet imperfectly made known, are the more acuminate parietals, the presence of four more vertebrae, where the last neural spine stands on the thirty-seventh instead of the thirty-fourth; and one more pair of ribs; the considerably greater breadth of the scapula, and strongly peculiar-periotic bones.

This species may readily occur on the European coasts, and is no doubt allied to, or the same as, the species pursued by the Biscay whalers, which Eschricht\* says is related to the *australis*. This does not appear to have been described, though catalogued without reference by Gray and Flower, under the name of *biscayensis*. The former says† its head is two-fifths the length, by what authority does not appear, as he states that he has not seen specimens. The characters which separate the genus *Balaena* of this author, from *Balaena*, appear to be very slight.

Harlan, in *Fauna Americana*, includes a species *Balaena glacialis* Klein, or Nord-Caper of some old authors. There is no real description of this animal extant, and Scoresby and Cuvier regard it, with good reason, as imaginary.

The species above described may be called *Balaena cisarctica*; its skeleton will be more fully illustrated in a future publication.

On some Conirostral BIRDS from Costa Rica in the Collection of the Smithsonian Institution.

BY JOHN CASSIN.

1. *SPOROPHILA CORVINA*, (Sclater.)

*Spermophila corvina*, Sclat., Proc. Zool. Soc. London, 1859, p. 379.

One specimen only, which is in adult plumage, and presents all the characters of this species given by Mr. Sclater, as above. San Jose, Mr. J. Carmiol.

2. *PHONIPARA PUSILLA*, (Swainson.)

*Tiaris pusilla*, Swains., Philos. Mag., 1827, p. 438.

San Jose, Mr. J. Carmiol.

3. *PYRGISOMA KIENERI*, Bonaparte.

*Pyrgisoma Kieneri*, Bonap., Consp. Av. i. p. 486, (1850.)

One specimen only, which is in adult plumage, and is the first that I have ever seen. This species is clearly distinct from *P. biarcuatum*, though strictly of the same genus, being smaller, and having a strong character in the wide transverse band on the breast. It is sufficiently described by the Prince Bonaparte, as above. Dr. Cabanis' note on this species and *P. biarcuatum* in Journ. Orn., 1860, p. 412, is to me difficult to understand, especially as he seems never to have seen the latter bird nor the description of it in Voy. Venus, Zoologie, vol. v. p. 216, (Paris, 1855.) The two species are quite distinct. Mr. J. Carmiol.

4. *MELOZONE LEUCOTIS*, Cabanis.

*Melozone leucotis*, Cab., Jour. Orn. 1860, p. 413.

Specimens in adult plumage. This species is not, in my opinion, of the same genus as the preceding and *P. biarcuatum*. Angostura, Costa Rica, March 2, 1864. Mr. Carmiol.

\*Comptes Rendus, 1860, p. 924.  
1865.]

† Ann. Mag. Nat. Hist. 1860, p. 249.

5. *PITTLUS GROSSUS*, (Linnæus.)*Loxia grossa*, Linn., Syst. Nat. 1. p. 307, (1766.)

One specimen in young plumage. Paqua, Mr. J. Carmiol.

6. *EMBERNAGRA STRIATICEPS*, Lafresnaye.*Embernagra striaticeps*, Lafres., Rev. Zool., 1843, p. 154.

Clearly this species, and quite similar to specimens in the Academy Museum bearing the valuable labels of M. Jules Verreaux. Specimens of *Arremon conirostris*, Bonap., are also in the Academy Museum, from the same excellent naturalist, and labelled with his usual great care and accuracy. The distinctions between these two species are indicated correctly by Messrs. Sclater and Salvin in Proc. Zool. Soc. London, 1864, p. 352, but unfortunately with their usual great economy of words! Angostura, June 8, 1864. Mr. Carmiol.

7. *ARREMON RUFIDORSALIS*, nobis.

Allied to *A. aurantirostris*, *spectabilis* and *erythrorhynchus*, and about the same size, but with the back chestnut. Bill red; edges of wings at shoulders yellowish-red.

Head above black, with a medial longitudinal band of dark ashy; cheeks black, long superciliary line white. Back chestnut; rump and upper tail coverts dark olive green; wings dark green, the outer coverts tinged with chestnut; shoulders narrowly edged with yellowish red; tail brownish black. A wide pectoral band, black, edged below with dull greenish; chin black; throat and middle of the abdomen white; flanks and under tail coverts dark olive green, (especially the under tail coverts;) under wing coverts green; bill bright yellowish red; feet greenish brown.

Total length about 6½ inches, wing 3, tail 2½ inches.

*Hab.*—Turrialba, Costa Rica. May 24, 1865, Mr. J. Carmiol.

Resembles most nearly *A. spectabilis*, Sclater, Proc. Zool Soc. London, 1854, pl. 67, but has a wide pectoral band and dark green under tail coverts, and differs from that and all other allied species in having the back chestnut. In the present specimen the bill is bright yellowish carmine, paler at the base of the under mandible.

8. *BUARREMON BRUNNEINUCHA*, (Lafresnaye.)*Embernagra brunneinucha*, Lafres., Rev. Zool., 1839, p. 97.

Dota, Costa Rica, July 24, 1864. Mr. J. Carmiol.

9. *BUARREMON CRASSIROSTRIS*, nobis.

Bill strong and larger than usual in this genus; wing short, rounded; tail rather long; feet strong. Head above dark chestnut, which color extends somewhat on the back of the neck; throat and sides of the head fully encircling the eyes dark greenish brown, (nearly black,) some feathers of the throat and others forming an obscure line from the corner of the under mandible white at their bases. Entire upper parts of body dark olive green, lighter on the rump, a few of the longer upper tail-coverts tinged with brown; wing dark brown, all the quills and coverts widely edged with green, uniform with the back. Middle of breast and abdomen bright greenish yellow, sides, tibiae and under tail-coverts dark green, very nearly uniform with upper parts of body; tail dark brown, nearly black. Bill light-colored, (in specimen, the upper mandible is light yellowish horn color, under mandible pale yellowish;) feet reddish-brown.

Total length about 6 inches; wing 3, tail 2½ inches.

*Hab.*—Barranca, Costa Rica. April 14, 1864, ♂, Mr. J. Carmiol.

This bird forms a new subdivision of the genus *Buarremon*, easily characterized by its strong and more *Pyrranga*-like bill. It is most nearly related to the species of the group *Pyilopus*, but does not intimately resemble any of those nor other species known to me.

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10. BUARREMON CHRYSOPOGON, (Bonaparte.)  
*Chrysopoga typica*, Bonap. Consp. Av. i. p. 480, (1850.)  
*Ataleptes chrysopogon*, Bonap.  
*Buarremon gutturalis*, Lafres., Rev. Zool., 1842, p. 97?  
 This bird seems to be regarded by authors as entitled to the name here adopted, but specimens in the Academy Museum bear Paris labels: "*Arremon gutturalis*, Lafres." Dota, Costa Rica, July 24, 1864. Mr. J. Carmiol.
11. CHLOROSPINGUS ALBITEMPORALIS, (Lafresnaye.)  
*Tachyphonus albitemporalis*, Lafres., Rev. Zool., 1848, p. 12.  
 San Jose, Costa Rica. Dr. A. von Frantsius.
12. PHENICOTHEAUPIS RUBICOIDES, (Lafresnaye.)  
*Saltator rubicoides*, Lafres., Rev. Zool., 1844, p. 41.  
 Grecia, Costa Rica, Dec. 12, 1864. Mr. Carmiol.
13. TACHYPHONUS DELATREI, (Lafresnaye.)  
*Tachyphonus DeLatrei*, Lafr., Rev. Zool., 1847, p. 42.  
 One specimen only of this species in very fine adult plumage, but not different in any respect from others in the Academy Museum from New Grenada. This bird is scarcely a *Tachyphonus*, nor congeneric, properly, in my opinion, with any other bird with which I am acquainted. Paqua, Costa Rica, March 23, 1865. Mr. J. Carmiol.
14. TACHYPHONUS LUCTUOSUS, D'Orbigny et Lafresnaye.  
*Tachyphonus luctuosus*, D'Orb. et Lafres., Mag. Zool., 1837, p. 29.  
 D'Orb. Voy. Am. Ois., pl. 20.  
 Numerous specimens, in nearly all of which the males have a partially concealed but well defined coronal spot of pale yellow, a character not previously known in this species. Those evidently in quite mature plumage are larger than D'Orbigny's specimens in the Academy Museum, but not larger than his figure above cited. The coronal spot is not present in D'Orbigny's specimens, nor in numerous others which I have examined, and I suspect it appears only at maturity, or in full nuptial plumage. No other peculiar character is apparent to me in the present specimens. Angostura, March 10 and June 7, 1864, and March 16, 1865. Mr. J. Carmiol.
15. TANAGRA DIACONUS, Lesson.  
*Tanagra Diaconus*, Less., Rev. Zool., 1842, p. 175.  
 San Jose, Costa Rica, April 5, 1864. Mr. J. Carmiol.
16. TANAGRA MELANOPTERA, Hartlaub.  
*Tanagra melanoptera*, Hartl., Rev. Zool.  
 Turrialba, Costa Rica, March 9, 1864. Mr. J. Carmiol.
17. PYRANGA BIDENTATA, Swainson.  
*Pyranga bidentata*, Swains., Phil. Mag., 1827, p. 428.  
 "Iris Yellow." Birris, Costa Rica, May 17, 1865. Dr. A. von Frantsius.
18. LANIUS LEUCOTHORAX, Salvin.  
*Lanio leucothorax*, Salv., Proc. Zool. Soc. London, 1864, p. 581.  
 Numerous specimens, all of which present with much uniformity the peculiar characters of this curious species as given by its discoverer, that excellent naturalist and most judicious and liberal patron of the zoological sciences, Osbert Salvin, Esq., of London.  
 Angostura and Payariqui, Costa Rica, March, 1865. Mr. J. Carmiol.
19. EUPHONIA FULVICRISIA, Sclater.  
*Euphonia fulvicrisia* Sclat., Proc. Zool. Soc. London, 1856, p. 276.  
 Specimens apparently quite identical with others from New Grenada in Capt. Michler's collection in the Smithsonian Museum.  
 Angostura and Paqua, Costa Rica, March, 1865, Mr. J. Carmiol.  
 1865.]

## 20. EUPHONIA HIRUNDINACEA, Bonaparte.

*Euphonia hirundinacea*, Bonap., Proc. Zool. Soc. London, 1837, p. 117.  
Turrialba, Costa Rica, March 10, 1864. Mr. J. Carmiol.

## 21. EUPHONIA GRACILIS, (Cabanis)?

*Phonasca gracilis*, Cab., Jour. Orn., 1860, p. 333?

Young birds, which seem to be this species. Mr. J. Carmiol.

## 22. EUPHONIA ANNEÆ, nobis.

About the size of and resembling *E. ruficeps*, D'Orb. et Lafres., but with the under parts of body clear yellow, and the under tail coverts white. Bill moderate, rather wide at base; wing short, with the third quill longest; tail short. Head above to occiput dark yellowish chestnut, other parts of head, including throat, black; body above, wings and tail fine dark violet-purple, (not steel blue, as in *E. ruficeps*;) under parts of body clear yellow; under tail-coverts white. Quills black; inner webs of secondaries and tertiaries with large white spaces; tail feathers black, edged with violet purple, the outer feathers with large white spots in their terminal halves. Bill and feet dark bluish, (in skin.)

Total length about  $4\frac{1}{2}$  inches; wing  $2\frac{1}{2}$ , tail  $1\frac{1}{2}$  inches.

*Hab.*—Santa Rosa, Costa Rica, March 3, 1865. Mr. J. Carmiol. Specimen in Museum Smithsonian Institution, Washington.

Of this interesting species one specimen only is in the collection of Mr. Carmiol, and is fortunately in adult plumage. It is allied to the South American *E. ruficeps*, *xanthogastra* and others, belonging to the subgroup designated *Acroleptes* by Dr. Cabanis. (Jour. Orn., 1861, p. 90.) This bird has the upper parts fine lustrous violet-purple, quite different from the steel blue and violet of *E. ruficeps*, and it differs also in having the under parts clear yellow without orange or darker shade, as in that species. The under tail coverts are white in this species, but yellow in all its allies. Tail slightly emarginate.

This handsome little bird is dedicated to the lady of my friend Daniel Giraud Elliot, Esq., of New York, whose excellent judgment and exquisite taste have most efficiently aided her husband in the production of the most splendid ornithological works ever produced in this country.

## New POLYZONIIDE, Gervais.

BY HORATIO C. WOOD, JR., M. D.

## GLOMERIS NICOLOR.

*G. parvus*; dorso olivaceo-nigro, linea mediana brunnea (interdum obsoleta) ornata; lateribus dilute brunneis; oculi utrinque 6.

The eyes are arranged in two straight linear series, of six each, on the outer edge of the head. The antennæ are somewhat elongate, filiform, and composed of seven joints. Their last article is very small and inconspicuous, but the penultimate is very large and long.

The first scutum is semilunar and of a brownish tint. The second is not very large, and has the anterior half of its surface chased with numerous parallel transverse lines. Each scutum has a transverse, somewhat semilunar, dark olive blotch, which, from the second to the last, covers the whole of its dorsal surface. The second scutum has a blotch of about the same size as the others, and another very small one in front of this. The last scutum is brownish with a rather indistinct olive blotch on each side.

This species is very interesting from the fact of its being the first *Glomeris* found in Asia. As it has only 12 eyes, some naturalists would consider it as representing a new genus, and if it is hereafter found that there are other Asiatic species with this peculiarity, I myself would regard it generic. Almost, if not quite, all the European and African species have 16 eyes; but a genus has been described with the name *Gervaisia*, from the Carpathian mountains, which has but five pairs of eyes. Taking this fact into consideration, I have

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hesitated to consider this one character sufficient to indicate a new genus in a single species.

*Hab.* Hong Kong. Wm. Stimpson, M. D.

OLIGASPIS\* n. g.

Corporis segmenta 9; antennæ brevissima, quinque articulata. Oculi aggregati.

This genus is allied to *Zephronia*, from which it differs entirely in the number of its segments. The antennæ are very short and thick.

O. PUNCTICEPS.

O. dilute olivaceo brunneus, capite et segmento cephalico castaneis; capitis superficie antica fere rude punctata; segmentis postice obscure rubido-brunneo marginatis.

The head superiorly is emarginate and a little swollen at its external angles so as to give somewhat of a reniform appearance. Its vertex is smooth. Many of the scuta have a large dark olive blotch or even blotches. Their surface is mostly smooth and polished. The last scutum is very closely and distinctly punctate. The male genital organs have a pair of very heavy forceps on each side, resembling the claws of a crab. These are placed at an angle with one another, their bases attached to opposite sides of a broad plate. On one side of their lower part is a curious surface corrugated by close, straight, parallel furrows.

Springing from the top and centre of this broad plate are a pair of straight diverging small processes, with a conical central tongue or process.

I have never had an opportunity of examining a female. For figures, illustrating this species, see my forthcoming Monograph of North American Myriapoda. [Trans. Philos. Soc.]

*Hab.* Port Natal. Rev. Alden Grout. Mus. A. N. S.

On a New Genus of VESPERTILIONIDÆ.

BY H. ALLEN, M. D.

The genus *Synotus*, founded by Keyserling and Blasius,† had for its type the common *Barbastelle*. But Dr. Gray‡ and Buonaparte,§ having previously defined *Barbastellus* as a distinct genus, it follows that *Synotus* is but a synonym of *Barbastellus*. In my memoir on N. A. Bats,|| I followed Wagner,¶ who placed both the American and European species under *Synotus*. A more extended study of this group has convinced me that this course is untenable. There is not sufficient evidence in the diagnosis of *Synotus*, as given by K. and B., to warrant the conclusion that it was intended to apply to the American species; and since they cannot be received by either *Plecotus* or *Vespertilio*, it is necessary to propose a new genus to include them.

CORYNORHINUS, n. g.

Skull slightly depressed at vertex; supra-occipital region inflated, sides inconspicuous; frontal bones without crest. Nasal bones, broad, flat, not depressed; median fossa marked,—linear; superior border of anterior nares rounded; summits convex and somewhat higher than orbital processes of superior maxillæ. The latter processes are swollen, and extend anteriorly

\* Ολιγας άστρις, Scutum.

† Wirbel thiere Europas, 1840, 55.

‡ Zoological Journal, II. 1826, 243.

§ Fauna Italica Fascic. 15, tab. 15, 1866.

|| Monog. N. A. Bats, Smithsonian Inst., June, 1864.

¶ Schreb. Sang. v. 1855, 719.

beyond the incomplete infra-orbital ridges, to which the infra-orbital foramina are nearly contiguous. Zygomatic arch expanded at posterior third. Molars  $\frac{5}{8}$ . Cochleæ not visible. Internal basal lobe of ear rounded, thickened, gradually losing its distinctness along the marked fold at inner border. Inter-auricular membrane rudimentary; external basal lobe terminating on a line with the angle of the mouth; it possesses a manifest lobe on the internal surface. Antitragus scarcely perceptible. Tragus pointed gradually, external basal lobe conspicuously cupped. Nose with two lateral hairy converging excrescences—nostrils wider than long, subtriangular. No rounded swelling at base of foot. Vertebrae of tail, 7.\*

#### C. MACROTIS.†

Head half the length of body. Upper lips tumid,—on sides of face rather thickly set with pendant hairs. Excrescences on a line with the lateral border of nostrils sparsely haired; tuberosities at base flattened, well defined posteriorly. Nostrils terminal, of an irregular triangular shape, the apices pointing inward; exterior lateral angle acute, borders not everted; mental space narrow, crescentic. Ears, length of body, with internal fold one-fifth width of auricle, sparsely haired at internal border, tips turned slightly outwards; outer half of auricle marked with irregular transverse lines; the inner lip to external basal lobe convex, nearly as high as long. Antitragus simple, linear. Tragus nearly half the height of auricle, interior border thickish and marked with a few hairs, tip rather blunt; exterior basal lobe longer than wide, inner and outer borders deflected upwards. Outer end of the free edge of the sigmoid internal lobe thickened. Fur long and silky, that of the back of a blackish hue at base, verging to an obscure fawn or brown at tip. The hair is, therefore, indistinctly bi-colored. The extent of the tip coloration varies, but in all specimens that of the color of the base predominates. The hair of the belly is blackish at root, in some specimens slightly plumbeous. Tips grayish, running to white toward the pubis.

\* Compare *Plecotus* (*P. auritus*). Skull not depressed at vertex; supra-occipital space well defined but little inflated; frontal bone crested. Nasal bones narrow, depressed, no median fossa. Orbital process produced, bounded anteriorly by the infra-orbital ridge, which is sharply defined, complete, and protects the infra-orbital foramen immediately in front. Zygomatic arch expanded at middle third. Molars  $\frac{5}{8}$ ; cochleæ not visible.—Internal basal lobe of ear obscure; a thin papery fold terminating the internal border, and runs thence upwards and inwards, terminates in a prominent, thickish lobe, forming the outer boundary of the large inter-auricular membrane. Antitragus salient, convex, external basal lobe simple. Tragus broad, points sharply; external basal lobe developed, incurved upon itself. Nose simple—nostrils longer than wide, with tumid inner walls. Base of foot with small rounded swelling. Joints of tail, 8.

*Vespertilio* (*V. subulatus*).—Skull not depressed at vertex; supra-occipital region greatly swollen; par-occipital process trenchant, nearly as long as condyles; nasal bones narrow, convex, higher than orbital process, and tapering from above downwards. Orbital process slight, swollen, not involving side of face; infra-orbital foramen at posterior fourth of orbito-nasal space. Zygomatic arch convex, not expanded, becoming more slender posteriorly, depressed in middle. Cochleæ visible. Molars  $\frac{5}{8}$ .—Internal basal lobe of ear simple, acute, inner border of auricle simple. No swelling at base of foot. Vertebrae of tail, 9.

*Barbastellus* (*B. communis*).—Skull scarcely depressed at parietal suture. Nasal bones flat, depressed below the level of the orbital process; internal process produced inferiorly at anterior nares. Infra-orbital ridge rudimentary, foramen midway between orbit and anterior nares. Zygomatic arch straight, and of uniform tenuity. Molars  $\frac{4}{5}$ . Cochleæ visible posteriorly.—Internal basal lobe of ear scarcely perceptible, not joining the small inter-auricular membrane; internal border of ear not folded backwards, but erect; external border minute; external basal lobe simple, terminating above the angle of the mouth. Antitragus sharp, well defined, convex. Tragus points gradually, external border obscurely bi-emarginated; basal lobe simple, interior border alone curved, to form a minute wart. Nose simple, truncate; nostrils irregular, inner border produced laterally, not tumid. No rounded swelling at base of foot. Joints of tail 9. (This genus has remote affinities with *Nycteris* and *Megaderma*.)\*

† (Mon. N. A. Bats, loc. cit.)

\* *Exotilus*, GERVAIN, (Castelnau's *L'Amérique du sud* Mam. 1855, p. 77. pl. xiii. f. 6) apparently belongs to this group. I have not had an opportunity of examining it.

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## C. TOWNSENDI.

Head length of body. Upper lip slightly tumid on sides of face, a line of delicate hairs pendant. Excrescences sparsely haired; tuberosities swollen at base, bulging, outline obscure inferiorly. Nostrils terminal, of an irregular trilobed shape; external lateral angle obtuse, edges everted, with internal inferior border rimmed. Chin with a wide triangular mentum. Ears with internal fold one-fourth width of auricle, sparingly dotted with hair. Inner lip to external basal lobe convex, much longer than high. Antitragus inconspicuous. Tragus nearly half the height of auricle; internal border thickened, and slightly haired; exterior basal lobe indistinctly quadrangular, wider than long, and somewhat flattened externally, border convex; central incisions of upper jaw almost unicuspid.\*

Fur long and silky, on back less distinctly bi-colored than in the preceding species, verging in some individuals to unicolor. The tips are of a darkish brown mixed with grey, verging to the style seen in *macrotis*. The fur of the belly is also blackish at base, with occasionally a ferruginous tinge; the tips are of two kinds, either a whitish hue, as in *macrotis*, or of an indistinct yellowish brown.

The points mentioned in the above descriptions with reference to the "internal basal lobe" and "inter-auricular membrane," may need explanation. A simple auricle is seen in *V. subulatus* with a clearly defined internal border and basal lobe. In *Plecotus*, *Barbastellus* and *Synotus* a crescentic fold of membrane is seen at basal region of internal portion of auricle, which is evidently homologous with the free lobe of the simple auricle. But surrounding and extending upwards from it along the inner border is a membranous fold, which renders the true outline obscure. Such growths I consider to be appendages to the auricle, and, while complicating the detail of structure, in no way affect the plan. Should these folds meet across the head, there would be formed an "inter-auricular membrane;" this may be complete, (that is, extending the entire length of auricles), as in some genera of *Noctilionidæ* and *Megadermatidæ*; or it may be rudimentary, as in the above genera. In the latter class the appendages are quite largely developed, though not touching; and in this connection they may be considered to be rudiments of an inter-auricular membrane.

## September 5th.

The President, DR. BRIDGES, in the Chair.

Fifteen members present.

Dr. Leidy remarked, that of the two fishes from the Isle of Shoals, N. H., presented this evening by Mr. W. M. Canby, one was of unusual interest. It was a fetal Dog-fish, or Dog-shark, with the vitelline sac appended to its abdomen, which Mr. Canby had obtained, together with others, from a gravid parent fish. Mr. C. had heard a dispute among several persons as to whether the Dog-fish (*Acanthias Americanus*) laid eggs or brought forth living young, and, having mentioned the matter to a fisherman, the latter said they brought forth living young; and an opportunity offering shortly afterwards, proved it by opening a gravid female and taking out the living young, of which the specimen presented was one.

The deaths of Sir Wm. Jackson Hooker, of England, and Mr. Charles J. Wistar, of Germantown, correspondents of the Academy, were announced.

\* In Mon. loc. cit. p. 66, read, on 7th line, less "distinctly bifid at cutting edge."

September 12th.

The President, DR. BRIDGES, in the Chair.

Eighteen members present.

The deaths of Mr. Jacob R. Smith and Mr. Joseph D. Brown, members of the Academy, were announced.

September 19th.

The President, DR. BRIDGES, in the Chair.

Twenty members present.

The following papers were offered for publication :

"On a new generic type of Sharks," and "On two species of Delphinids." By Prof. Theo. Gill.

"Notes on a species of Hunchback Whale." By Prof. E. D. Cope.

Dr. Leidy directed the attention of the Academy to some fossil remains of Rhinoceros from Texas and California, which, he observed, together with those already described by him from the Mauvaises Terres of White River, and from the Niobrara or L'eau-qui-court River, of Nebraska, were probable evidence of the former existence of five species of the genus within the boundaries of the United States.

One of the species, previously described, from White River, is so peculiar as to constitute a subgenus apart from the others. It was a small animal, with a hornless skull, and possessed six incisors and a pair of canines in each jaw, besides the usual series of seven molars on each side. It was named *Hyracodon nebraskensis* (Proc. Acad. Nat. Sci. 1856, 92.)

The second species, *Rhinoceros occidentalis*, from White River, has the same formula of dentition as the Indian or Javan Rhinoceros, and was about half the size of that animal.

*Rhinoceros crassus*, (Pr. Ac. 1858, 28), from L'eau-qui-court, has the same formula of dentition as the Indian Rhinoceros, and was about the same size. The incisors appear to have held the same proportionate size as in the latter, but in *R. occidentalis* they were proportionately very much smaller. A worn superior incisor of *R. crassus* measures 28 lines antero-posteriorly and 10 lines transversely. The corresponding tooth of *R. occidentalis* measures 11 lines by 5 lines. A broken superior last molar of the former is estimated to have measured 28 lines obliquely and externally, the same diameter transversely and anteriorly, and 24 lines antero-posteriorly and internally. In *R. occidentalis* corresponding measurements hold the relationship of 18 lines, 18 lines, and 16 lines.

The Texan Rhinoceros is indicated by the greater and more characteristic portion of the crown of an upper molar tooth, probably the penultimate. It was obtained from a tertiary deposit, probably miocene, and submitted to Dr. L. for examination, by Dr. Benj. F. Shumard. It presents much the general appearance of preservation of the Mauvaises Terres fossils of White River. It evidently indicates a species different from those of the latter locality, and was larger than either, approaching in size *R. crassus*, though it was smaller. The estimated measurements of the restored tooth are two inches for the antero-posterior diameter externally, 22 lines for the transverse diameter anteriorly, and 18 lines in the latter direction posteriorly. The median valley is strongly sigmoid, arising from each of the inner lobes being provided with an oblique offset extending into the valley in a parallel manner. For the species the name of *Rhinoceros meridianus* was proposed.

The California Rhinoceros is indicated by the greater portion of the right

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side of a lower jaw retaining the symphysis; from Chili Gulch, Calaveras Co., and was submitted to Dr. L.'s inspection by Prof. J. D. Whitney, who is in charge of the California State Survey. The specimen resembles, in its condition of preservation, the Mauvaises Terres fossils of White River, Nebraska. The formula of dentition is the same as in the Indian Rhinoceros, and the proportionate size of the teeth was the same. It was about the size of *R. occidentalis*, or perhaps a trifling degree larger, but its lateral incisors were triple the size. The estimated length of the jaw is about 16 inches. The space occupied by the molar series is 8 inches. Regarding the specimen as indicating a species distinct from any of the preceding, the name of *Rhinoceros hesperius* was proposed for it.

September 26th.

The President, DR. BRIDGES, in the Chair.

Thirty-two members present.

On report of the respective Committees, the following papers were ordered to be published:

On a New Generic Type of SHARKS.

BY THEODORE GILL.

In the year 1858 the Smithsonian Institution received, from Capt. Stone, the jaws and vertebræ of an enormous species of shark existing in the Gulf of California and known to the inhabitants of the neighboring regions as the "Tiburón ballenas," or "whale shark." The specimen represented by the spoils was said to have been "twenty feet long," with a "head six feet wide," "pectorals three feet long" and "fukes six feet between tips." "The back from the head to first dorsal fin, brown with reddish spots." The head is represented as truncated in front.

The dried dentigerous band of the upper jaw is slightly curved forwards, about nineteen inches between the extremities, and somewhat more than an inch in width in front. The teeth are fixed and extremely minute, the largest being little more than a *line* in length, and decrease towards the ends of the jaw; they are disposed in regularly transverse rows, of which there are over one hundred and sixty (164—167) on each side, while in front there are from thirteen to sixteen in each transverse row; each tooth is recurved backwards and acutely pointed, swollen and with a heel-like projection in front rising from its base.

This type will be seen, therefore, to be very distinct, but is evidently related to the South African genus *Rhinodon*, and must be referred to the family of Rhinodontidæ with the name of *Micristodus punctatus*.

On two species of DELPHINIDÆ, from California, in the Smithsonian Institution.

BY THEODORE GILL.

While examining the species of Cetaceans, represented by skulls and skins, in the Smithsonian Institution, I discovered two species of Delphinidæ supposed to have been hitherto undescribed. Brief descriptions of these are now submitted; at another time, it is proposed to give more extended descriptions as well as figures.

LAGENORHYNCHUS OBLIQUIDENS, Gill.

The skull in its generic characters agrees with that of *L. leucopleurus*, the 1865.]

type of the genus. The beak is rather robust, its greatest width being contained about three times and a half in the length of the skull; thence it decreases gradually forwards, the lateral contour describing a sigmoid outline, while the surface above towards the end is moderately and quite regularly arched from side to side, no groove separating the intermaxillaries and supramaxillaries. The triangular or deltoid area, in front of the nostrils, is nearly plane but elevated, and its surface corrugated; it gradually ascends backwards to the posterior angles of the intermaxillaries, while forwards it is incurved, and continued as a narrow internal margin of the maxillaries, almost to the anterior fourth of the beak; its greatest width is less than half the width of the cranium. The interspace between the intermaxillaries is wide, and scarcely contracted at the middle. The supraoccipital projects forwards, and its point almost or quite touches the nasals. The temporal fossæ project far backwards. The lower jaw is nearly uniformly high for the posterior fourth of its length, and at its symphysis is again enlarged and deeper.

The *teeth* are elongated, boldly curved, in the upper jaw about thirty-two in number; all are directed obliquely forwards and outwards; the distance between the last and the posterior notch of the supramaxillary equalling the width of the bone; in the lower jaw there are about thirty or thirty-one teeth on each side, directed somewhat outwards, and the posterior one also slightly backwards.

Three skulls of adults of this species, obtained at San Francisco, California, are in the Smithsonian collection. They indicate a species different from any that has yet been intelligibly described. I refer it to *Lagenorhynchus*, as contradistinguished from *Delphinus* by its flat palate, destitute of lateral grooves; the differences between skulls of this genus and *Cephalorhynchus* are not evident from the published accounts.

#### PROCAENA VOMERINA, Gill.

The skull is very similar to that of *P. communis*, and the proportions generally differ little or none, but it is at once distinguished by the development of the vomerine bone, which is more developed and recurrent backwards, expanding below into a more or less enlarged horizontal process behind the palatines. The teeth appear also to be more numerous; in the upper jaw, on each side, there are about thirty-nine or forty teeth, disposed in two divaricating series, in the front of which are about eighteen, and in the posterior eleven. In other respects no decided specific differences seem to exist.

This species is represented in the collection of the Smithsonian Institution by the much injured skull of an animal obtained by Dr. Kennerly at Puget's Sound, and by the skin and skull of a younger animal, procured at San Francisco by Dr. William Stimpson as naturalist of the North Pacific Exploring Expedition.

#### Note on a Species of HUNCHBACK WHALE.

BY PROF. E. D. COPE.

The author has had an opportunity of studying the skeleton of a hunch-backed whale of our coast, preserved in the museum at Niagara Falls, in Canada. A label on the specimen explained that the animal was found dead at sea, forty miles from Petit Menan lighthouse, off the coast of Maine, and was towed to shore by a Capt. Taylor. It was carefully cleaned, and appeared to be perfect, except in the lack of the sternal, pelvic, and periotic elements. Its length, when fresh, was fifty feet.

It presents all the characters of the genus *Megaptera*, Gray, especially of the northern species, including the lack of coracoid process, and presence of a small coronoid process of the mandible. Its subordinate characters differ

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from those of the *M. longimana* and *gigas*, the known north Atlantic species, as figured and described by Rudolphi and Gray. The transverse process of the atlas is directed obliquely upward, truncate, deeper than long, measuring half the depth of the articular face, its upper origin above the latter, and at the base of the neural arch. A rounded process, bearing the posterior articular surface, projects into the upper part of the spinal canal. Of the transverse processes of the axis, the superior is longer; the canal is not depressed, a little over half the diameter of the centrum. The superior transverse processes increase in length to the fifth cervical, where they are straight and slightly descending; those of the sixth and seventh are well developed. The last is the only one without inferior process; the others are well developed; that of the fifth, three-fifths the diameter of the centrum, and slightly angulated near the middle. Total number of vertebræ, 48, all free; the neural spine is first smaller than the zygapophysis on the fortieth. The neural arches and spines are remarkably elevated on the dorsal and lumbar regions, somewhat as in the *Catodontidæ*: *e. g.*, in the 33d vertebræ, the vertical diameter of the centrum is 9.75 inches; and the height of the arch and spine, 17.87 inches, or nearly double; the position of the zygapophysis measures half the elevation. The caudal series is short, and though a few vertebræ have possibly been lost, the series appears as though complete; there are attachments for eight chevron bones. There are fourteen pairs of ribs, of which the anterior are simple-headed, and flattened distally; the first is especially dilated, double the width of the median, and presents a process on its posterior edge near the extremity. This is present on the two following, being successively nearer the extremity in each. Those of the last pair are slender, and longer than in *Balæna*, exceeding the second pair. The length of the humerus and remainder of the fore limb is 9.05 feet, equal the length of the cranium; they supported a fluke equal in life to one-fifth the total length. The breadth of the cranium measured below, from tip to tip of the orbital processes of the frontal, 6.41 feet, or to the length as 8 to 11; in Rudolphi's figure of the *longimana*, the proportions are as 8 to 14. Breadth between coronoids of mandible, 5.75 feet. The ulna is much curved, and with two proximal heads. Scapula, height, 29.6 inches; breadth, 44.4 inches.

This specimen differs from those described by Gray\* and Rudolphi,† in the long inferior lateral processes of the posterior cervical vertebræ; in the former, they are said to exist on the anterior only. W. P. Flower, however, in a valuable paper‡ on cetacean skeletons, describes two specimens, one in the museum at Louvain, and the other at Brussels, which exhibit these processes as far as the sixth and fifth vertebræ, respectively, but of diminished length. In the specimen under consideration, that of the fifth is as long as that of the second.

The parallelepiped form and elevated position of the transverse processes, and the internal process of the atlas, are not represented in Dr. Gray's figures.

The cranium is broader, in proportion to its length, than represented by Rudolphi, and shorter in proportion to the total, than in the measurements of Flower and Moore: in these it is one-fourth, or more; in the Maine specimen, one-fifth, or less. The fins are, also, relatively shorter, measuring one-fifth of the length, instead of one-third.

A most striking peculiarity of the species is the great elevation of the arches and spinous processes of the dorsal, and especially the lumbar vertebræ, reminding one of the structure in the toothed whales. The outline of the skeleton is thus somewhat humped behind, presenting a contrast to that represented by Rudolphi in the type specimen of the *longimana*, where the elevation of the arches and spines does not exceed the diameter of the centrum, on the lumbar region at least: on the 33d vertebra, the zygapophysis

\* Proc. Zool. Soc. Lond., 1864, 208.

† Mem. Acad. Berlin, 1828, 137.

‡ Pr. Z. S. Lond., 1864, 416-18.

measures one-third this height. The length of the diapophyses is considerable, and similar in both. Rudolphi represents eleven chevron bones, and the anterior ribs are not flattened, or furnished with an inner process in his figure.

In the *M. gigas*, the spinal canal is relatively larger, and the cervical superior and inferior transverse processes of one side are more symmetrical and similar.

An American fin-backed whale has been named *Megaptera americana*, from a very brief and indefinite description in the Philosophical Transactions, I. p. 11. A species named on such a basis can never be recognized; but, if we must accept it, the only character given, the relative lengths of the body and fin, are entirely at variance with those of the present species: the length of the latter is said to be one-third of the total.

Supposing the reduced number of vertebræ and chevron bones to be the result of accident, and the form of the anterior ribs to have been unnoticed by Rudolphi, the shorter head and fins, the peculiarly high neural spines and peculiarities of some of the cervical vertebræ, would seem to distinguish this specifically from the *longimana*, if, as is most probable from the recent researches of Gray, such characters are invariable in the species of Cetaceans. On such premises this animal may be called *Megaptera osphya*.

A species of this genus has left its remains in the miocene of Eastern Virginia, judging from periotic and other bones sent me by my friend Edw. Holway, of Yorktown. Probably it is one of the species described by Leidy, Proc. Acad., 1851, 308.

A pair of bullæ without their other periotic elements has been sent me from the Museum, Salem, Mass., by Frederick W. Putnam, Secretary of the Essex Institute. They were presented to the Museum by Capt. J. W. Clever, and are said to have belonged to a hunchbacked whale. Their locality is unknown.

The transverse section represents a cylinder. Taking the bulla of the left side, the incurved lip of the interior face (position derived from the figures of *Balæna australis* in Ossements Fossiles) forming no angle with the inferior aspect: this lip rolls regularly inward without compression or fold; with its lamina the smooth surface terminates, all the remaining surface of the bulla being closely rugose. Viewed from above, the anterior extremity is more contracted than the posterior, and the outer face presents three inflations, while the inner is medially straight. Of the supero-exterior inflations, the middle is prolonged into the usual superior process, which is much recurved, and constricts moderately the great fissure at two-fifths its length from its posterior extremity; it is separated by a deep fissure from the posterior inflation. The main fissure is in one plane, and is expanded into both lips anteriorly. The portion supporting the other periotic elements postero-interiorly stands on a strong pedicel. Greatest length, 4 in. 5 l.; breadth at middle inflations, 2 in. 8·4 l.

Huxley's figure of the periotic bones of *Balæna australis* (Elem. Compar. Anat. 273) represents the longer process as Cuvier, longer and not so acuminate as in our specimens of the *B. cisarctica*, but the shorter process as much shorter than in the former figure, and more as in our specimens.

A pair of earbones of one individual from the Museum Salem, differ considerably from those of three individuals of the *B. cisarctica* in the Academy collection of nearly the same size. In them an arched ridge descends from the upper elongate lip process, on its inner side, and, describing a curve, rises to the pedestal of the longer periotic process. In the *cisarctica* the ridge is inconspicuous, and includes but a groove between it and the labial border, while in the Salem specimen it is very strong, and, descending farther, includes a pocket with the lip border. In the latter there is a broad smooth rim on the rising outer lip margin of the other end; in the *cisarctica* none at all. Viewed from below, the end next the long processes is broader and more nearly truncate, owing to the strong development of the exterior inflation

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of that end into a strong solid basal angle, and the expansion of the inner basal outline. The angle formed by the meeting of the inner and under faces of the bulla is more acute, from the greater flattening of the former.

These differ as much from *Balena mysticetus angulata*,\* Gray. The long section of the opening is narrower, and the short portion shorter; the external basal angle opposite this portion, as well as the pocket, is not represented in Gray's figure. The former feature, with the greater prominence of the long external inflations at the other end, gives a very different inferior view, from the greater breadth, etc. The characteristic angle of Dr. Gray's figure is also wanting in the Salem species or variety.

Another bulla from Mus. Salem (No. 113) is narrower on the inferior view than even the *cis arctica*, and the outer lip of the opening is considerably higher. The inner inferior outline below the long process is very obliquely truncate, and the outer prominence near it is directed more outward. The inner or thick lip is not heavy, and is much plicate. The inner inferior compressed margin is much less flattened than the other Salem variety, (111—112.) Locality unknown.

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October 8d.

MR. CASSIN, Vice-President, in the Chair.

Fifteen members present.

Dr. Leidy observed that the fine specimen of Cryolite, presented this evening by Edmund A. Souder, Esq., was from Ivigtut, Arksuk Fiord, Greenland, and was a sample from a ship load, one of a number of similar loads imported to this place for the manufacture of soda alum.

Prof. Carson stated that he recently had an opportunity of ascertaining the plants from which the so-called American Tea is made. The variety called Green Tea is the product of the *Ceanothus Americanus*; the Black Tea, the product of the *Lysimachia quadrifolia*.

The death of Dr. Francis M. Moore, member of the Academy, was announced.

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October 10th.

The President, DR. BRIDGES, in the Chair.

Twenty-four members present.

Dr. Leidy made some remarks in relation to the specimens of oolitic phosphates of lime and alumina, from the Island of Navassa, W. I., presented this evening. The material, he stated, was imported in large quantities to this place, by Messrs. Potts and Klett, and was employed in the manufacture of a fertilizer. The mineral presents several varieties of color, but is especially remarkable for its constitution, resembling that of ordinary oolite. Dr. L. supposed that it was probably of organic origin, though the reverse opinion was held by persons of judgment.

Dr. Leidy further called the attention of the members to a collection of bones and stone implements, presented this evening by Mr. Frederick Klett. The remains were obtained from the Island of Orchilla, W. I., from a deposit of guano, eight inches below the surface. The bones are parts of three human

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\* Proc. Zool. Soc. 1864, 201.

skeletons, together with a few fragments of bird and turtle bones. They are all very friable and appear much eroded on the surface.

The human bones are all of mature age, and rather small. Most of them are portions of two skeletons, apparently a male and female; a few belonged to a third skeleton, apparently male. Of portions of three skulls, the most perfect is the greater part of a small cranium, judging from its size, that of a female. The base in advance of the occipital bone is broken away. The cranium is of the brachycephalic type and bears a near resemblance to that of the ancient Peruvian pattern. It is rounded or ovoidal, with a high compressed occipital region, with a quadrate outline viewed posteriorly, and an ovoidal outline viewed above and laterally. The forehead recedes in a gentle curve from the supra-orbital margins, and the supra-ciliary ridges are feebly developed. The greatest height of the cranium is on a line with the anterior glenoid tubercle and the centre of the sagittal suture. The biparietal diameter is 64 lines; the antero-posterior, from the glabella to the occipital protuberance, 76 lines; and the height from the anterior margin of the occipital foramen to the centre of the sagittal suture 64 lines. The breadth of the forehead at its narrowest part, just above the external angular processes of the frontal bone, is 44 lines; the height of the latter bone from the root of the nose to its summit is 49 lines.

Fragments of the other skulls indicate a larger size but the same form, except larger superciliary ridges. A fragment of the face of one of them exhibits the cheek bones prominent anteriorly, and the orbital and nasal orifices large.

The jaws are of moderate proportions and orthognathous. The teeth of all three skulls are of the ordinary forms. Those of two of the skulls are much worn. In one of the skulls some of the teeth had been lost during life, and the alveoli obliterated. In a lower jaw containing an entire series of teeth but little worn, the back two molars on one side present on the top of the crown a small cavity, probably the result of caries.

The remaining human bones consist of a few vertebræ with fragments of others, fragments of two scapulæ and innominata, a number of long bones of the extremities, and a few small bones of the feet.

The collection contains four humeri belonging to three skeletons. Two from one of the larger skeletons measure 12 inches in length from the summit of the head to the edge of the inner articular condyle, and 2 inches 10 lines in circumference, just below the deltoid insertion. A third humerus, apparently from the same skeleton as the more perfect cranium before indicated, is of more delicate form, 11½ inches in length, and 2 inches 8 lines in circumference at the middle of the shaft. The fourth specimen, intermediate in proportions to the others, has lost the head, and is peculiar from the very prominent sharp angular character of the shaft internally. All the humeri present a small intercommunication between the fossæ above the ulnar trochlea.

The bones of both fore-arms of a larger and smaller skeleton exhibit the following measurements: larger ulna 10½ inches long; smaller one 9½ inches; larger radius 9½ inches long; smaller one 8 inches 8 lines long.

Of two femora from a larger and a smaller skeleton, both without the head and condyles, one has measured about 17 inches in length, the other about 16½ inches. They are more bowed anteriorly than is usual, and both present a greater degree of prominence of the linea aspera.

Four tibiæ, without the head, belong to the same skeletons as the femora. The larger, when perfect, measured about 13½ inches long from the front of the head to the end of the inner malleolus; the smaller 13 inches. The former present nothing peculiar, but the latter are remarkable for their laterally compressed character; the antero-posterior diameter of the middle of the shaft or the breadth of the internal surface being 16 lines, while the transverse diameter is but 9 lines.

The stone implements found with the bones are six stone axes, of compressed conical form, with a sharp trenchant basal border and a pointed apex.

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Prof. Gill offered a communication on a new generic type of the family *Tapiridae*, of which two skulls, representing adult and very young individuals, are contained in the Museum of the Smithsonian Institution. The former indicates that the species attains a size superior even to that of *Tapirus americanus*, and that it is consequently much larger than the Tapir of Roulin. Both skulls were obtained, by Dr. W. S. White, on the Isthmus of Panama. The outline of the skull resembles that of the Pinchaque, (*T. Roulinii*, *Fischer*, 1829, = *T. villosus*, *Wagner*, = *T. andicola*, *Gloger*, 1842, = *T. pinchaque*, *Goudot*,) but the new type is distinguished at once by the peculiar development of the supramaxillaries, which are swollen above and in front of the infraorbital foramina, and thence extend upwards and backwards into a squamous portion which embraces with its fellow a thick, bony, nasal septum continuous with the vomer, and which is elevated to a line with the forehead, and has a widened upper edge, which still further enlarges behind and embraces the nasal bones. The grooves for the muscles of the proboscis are in front straight, entirely confined to the frontals, and do not encroach on the supramaxillaries; while behind they describe a spiral curve around a pit between the nasals and frontals. Other peculiar characters exist and will be hereafter illustrated. The species may be named *Elasmogaathus Bairdii*.

Mr. Glenn, of the Museum of Comparative Anatomy and Zoology of Cambridge, exhibited to the Academy various beautiful microscopic preparations made by him.

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October 17th.

The President, DR. BRIDGES, in the Chair.

Twenty-two members present.

The following papers were offered for publication:

"Observations on American Fossils, with descriptions of new species." By T. A. Conrad.

"Third Contribution to the Herpetology of Tropical America," and "A Contribution to the knowledge of the Delphinidæ." By Prof. E. D. Cope.

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October 24th.

The President, DR. BRIDGES, in the Chair.

Eighteen members present.

The following papers were offered for publication:

"On species of *Galeruca* and allied genera," and "Prodromus of the Anobiini inhabiting North America." By Dr. John L. LeConte.

"Notes of a study of the family Icteridæ." By John Cassin.

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October 31st.

The President, DR. BRIDGES, in the Chair.

Seventeen members present.

The resignation of Dr. Rand as Recording Secretary was accepted, and Dr. H. C. Wood, Jr., was unanimously elected.

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On report of the respective Committees, the following papers were ordered to be published :

Observations on American FOSSILS, with descriptions of two new species.

BY T. A. CONRAD.

Prof. Cook, of New Brunswick, N. J., has lately received a few fossils from Ocala, Florida, which prove the limestone of that locality to be of the same age as the Shark River marl of New Jersey. The species consist of *Globulus alveatus*, Con., *Venericardia prima*, Con., *Dosiniopsis alta*, Con. These are all Eocene species of California, Maryland and New Jersey. In this rock no doubt occurs *Carcharodon angustidens*, Agass., of which I obtained a specimen at Tampa Bay, Florida.

Among Prof. Cook's fossils are a few species from Jasper Co., Miss. The rock of this county, in which the fossils occur, is stated by Hilgard to be of the Jackson Group, (Upper Eocene.) The species are *Ostrea Tuomeyi*, Con., *Mortonia turgida*, Con., *Pecten Poulsoni*, Morton, *P. perplanus*, Morton, *Carcharodon angustidens*, Agass., *Orbitolites Mantelli*, Morton. The former of these I suppose to be the shell which Tuomey found so common in the Basilosaurus limestone of Alabama, and which he referred to *Pycnodonta vesicularis* (*Gryphæa mutabilis*, Morton.) It is very different, however, and may be distinguished by the following characters :

*OSTREA TUOMEYI*.—Ovate, sublobate, lower valve deep, umbo narrow, rough and unequal in surface, with rough lines of growth; not distinctly plicate; upper valve convex above, slightly convex below; with a rough and unequal surface; concentric lamination very prominent, when weathered.

It differs from *P. vesicularis* especially in wanting the inner plications about the upper submargins of the interior, and the umbo is much narrower; it is also a true *Ostrea*, whilst the *vesicularis* is the type of the genus *Pycnodonta*, Fischer, and characterizes the cretaceous era.

#### *Echinodermata.*

#### MORTONIA, Desor.

*MORTONIA TURGIDA*.—Suboval or subpentagonal, swelling medially, with a convex outline; thin on the submarginal portion of the disc; ambulacra elliptical.

Allied to *M. Rogersi*, but larger, thinner round the central prominence, more elevated medially, the depression about the mouth greater, and the anus smaller. It bears about the same relation to *Rogersi* as *Simendia alta*, Con., bears to *S. Lyelli*, Con.

#### *Testacea.*

#### LIODERMA, Conrad.

*VOLUTILITHES LIODERMA*.—This shell has not the characters of *Volutilithes*, but is covered entirely by enamel, has very oblique columnellar folds, and an outer lip somewhat emarginate on the upper part to its juncture with the body whorl; base deeply emarginate.

I have not met with this genus in any American Eocene bed.

#### SOLENA, Browne.

#### Subgenus LEPTOSOLEN, Conrad.

*SOLENA BPLICATA* (SILICUARIA) Con.—Cretaceous.

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## Third contribution to the HERPETOLOGY of Tropical America.

BY E. D. COPE.

## Alligator holois.

Muzzle  $6\frac{1}{2}$  inches from end to lines connecting orbits,  $5\frac{1}{2}$  inches wide near the middle. Two keels behind and between the eyes, diverging posteriorly, a short and nearly transverse keel in front of the eyes. Upper eye-lid divided by grooves into three areas; an elevated keel above each ear opening. Two oblique rows of elevated horn-like shields on each side of the neck, of rather small size, four on the inner, three on the outer rows; the third of the inner and second of the outer form, with two large elevated median plates, a transverse row. Four very high, short, keel-like postcervicals. Eight rows of dorsal shields, excepting anteriorly where there are six in the first cross-row, and four in the two succeeding; all are like heads of spikes keeled. Four rows on the tail at its middle. Lateral caudal shields continuous, abruptly elevated, like the dorsals, subquadrate. Sides with small rounded scales; width between dorsals and ventrals equal to length of third dorsal cross series. A large row of plates on the inner side of the fore arm. Claws long; no palmar webs. Abdominal rows eleven, each plate with a thin ossification; two or three large plates in the thoracic cross-row. End of tail little serrate above, scarcely compressed. From end of muzzle to occipital 12 inches; to between femora 32 inches; from latter point to end of tail 50 inches; total 7 feet 10 inches.

Color dark brown with vertical yellow bars on the sides and tail, the former very irregular. Chin, throat, under and upper lips yellow, without spots.

This rugged looking species belongs to the genus Alligator, as restricted by Gray, in which the prolongation of the nasal bones separates the external nares, and there is no cross ridge between the orbits. It approaches Jacare in that an external portion of this cross-ridge exists on each side. The habitat is not known, as the single specimen I have seen is preserved without label in the Museum of the University of Munich. Through the courtesy of Prof. C. Von Siebold, I was enabled to make the above description.

I may mention here that the crocodile described by me (Proc. Acad. 1860, 550) as *Mecistops bathyrhynchus*, is the species identified by Dr. Gray (Catal. Brit. Mus.) with the *C. intermedius* Graves; with the limited published material as a basis, I have reached a different conclusion.

*Chelopus punctularius*, *Emys punctularia* Daud., *E. scabra* Bell, Gray, Linnæus (sive Agass.

At first sight, the female of this animal gives the impression of a Testudinid form, with separate caudal plates, but an examination of the phalanges shows their number to be that in the Emydids, two for the longest digits, (exclusive of ungueal,) instead of but one remaining upon the extinction of the proximal, as in the former. The proximal phalanx is articulated somewhat, as in *Cistudo*, but is shorter, and nearly excluded from a serial connection; its proximal glenoid cavity is superior, and near the distal condyle. The inferior projection of the proximal end gives the foot its angulated outline. The structure is not unlike that in *Chelopus mahlenbergii*, and there are really more phalanges than in *Cistudo*, where the foot is longer; the external digit behind having two internal phalanges instead of but one. In similar manner the reduction of the penultimate phalanx in the parallel *Sternotherus*, prepares us for its absence in *Pelomedusa*\*, the extreme of the Pleurodera in this direction, and representative of the Testudinids. *Podocnemys* and *Peltecephalus* imitate the Chelonids in their overarched temporal fossae, as observed by Wagler, while intermediate forms are more or less similar to some Emydids. After a consideration of various osteological peculiarities, I incline to differ

\*Which has not, I believe, been previously noticed.

from Agassiz, who mingles these types with those of *Amyda*, and to regard the Testudinata as primarily divisible into three orders or suborders, *Cheloni*, *Amyda* and *Pleurodira*.<sup>2</sup>

The name *Chelopus Rafinesque* has been recalled by Leconte, as identical with *Calemys*, Ag., to which *Nanemys*, Ag., must probably be united, and which have been previously named *Geoclemmys*, by Gray. The present species is in any case congeneric with *G. annulata*, Gray, which is of terrestrial habit.

Pectoral plates normal, broad, sternum notched behind. Feet very short, clubbed, quite as in the Testudinidae, digits flattened above, last phalanges only distinct, not webbed; claws short, obtuse. Head very small, covered with a smooth skin, without sub-divisions. Eyes lateral, with a transverse depression between them; muzzle short, nearly vertical, swollen above, nostrils anterior. Alveolar plate narrow, without median ridge, cutting edge smooth, neither notched, hooked nor toothed at the symphysis. Mandible broad. A strong zygomatic arch.

In a ♀ specimen the dorsal region is elevated with a trace of a broad keel, as in *Cistudo*, and the sides are steep. The outline is parallelogrammic, rounded at the extremities. Posterior slope regularly oblique. Margin nowhere reflexed, posteriorly weakly serrate. Twenty-five subquadrate marginals, the nuchal broad behind. Vertebrae, the four anterior of equal breadth, the anterior pentagonal, the remainder hexagonal. All the plates concentrically sulcate, with a slightly rugose areola. Inguinals very small; sternocostal bridge very broad. Lobes of sternum short, free outlines, subquincquelateral. Large scales all round the forearm and foot, (seven rows anteriorly, two rows of three each behind,) on the sole and heel only of the hind foot. Above dark brown; sternum black, bordered with yellow; remaining under surfaces yellow; forelegs with a black stripe on outer edge. Top of head black; a narrow red band from behind and above the eye to the middle of the neck, above and below which are black lines on a yellowish ground; neck below immaculate.

This species is more elongate than *C. annulatus*; anal and gular plates larger; color of head and extremities different. It is nearer the *C. areolata*, † A. Dum., but is even more testudiniform. The latter is less elevated, the hind feet a little webbed; the carapace more elongate and narrowed anteriorly; the artist has given six vertebral shields; the anterior lobe of the plastron is considerably shorter.

One ♀ specimen in the Smithsonian Museum, obtained in Yucatan by Arthur Schott, naturalist to the Scientific Exploration of that country.

In a female from Tabasco the frontal depression is less marked and the muzzle not quite so rounded. In a male from the same locality the muzzle is elongate and the vertex and front flat. This is evidently the *E. scabra* figured by Bell, agreeing with it in the superior position of the head bands, etc., thus differing from the allied *dorsalis* Gray, Spix. The carapace differs from that of the Yucatan female in sexual characters, as the revolution of the margins, but has a very small nuchal shield, and the first vertebral prolonged between the marginals, while the former exhibits a short broad shield. This is the only difference which cannot be regarded as sexual.

This, with the following seven species of Tortoises below enumerated, was presented to the Smithsonian Institution by Dr. Berendt, who, during a residence at Tabasco, Mexico, devoted much attention to the natural products and features of the country. He has furnished me with the following notes on the Testudinata. The specimens are complete and of adult age.

The *Chelopus punctularius* is the *Mojina* of the natives of Tabasco.

"*Mojina* is often found tame in the houses, and attaches itself very much to men. The very same specimen which I brought living with me, and left

<sup>2</sup> Vid. Proc. Acad. Phil., 1864, 181.

† Suspected by Agassiz to be the *Malacoclemmys pulchris* of North America.

with Prof. Baird, I got from an Indian woman, living in a hut on the Tabasquillo River. I asked for turtles, when she said she had one, but it was in the woods behind the house. She went to the door and called, 'Mohina, Mohina!' and the turtle came out of the bushes to the house, and was sold to me. I could never induce her to eat any thing for more than three months, until I gave her, in Washington, some cherries, which she tried, and afterwards commenced to eat. It was told me that the *Mojina* eats animal food (?)

*Ptychemys ornata*, Agass. et Bell.

"*Hicotea*" of the natives.

*Dermatemys mavei*, Gray. "*Emys berardi*, Dum."

Two specimens, eighteen inches long, of this remarkable species, agreeing with Gray's figure, except in the single gular plate, and presence of a minute gemmiform intergular plate, as in some Hydraspididæ. This is the first instance of the kind among the Emydidæ, of which family this species presents every character. Called *Tortuga blanca*.

"*Hicotea* and *Tortuga* live on vegetable food, leaves, grass, and, principally, the fruits of Tobillo (*Spondias mombin*) and Amate (a *Ficus*.) At the time the amate is ripe, the tortugas are caught easily, and in numbers, under these trees. They distinguish in Tabasco three kinds of *Tortuga*: *T. blanca*, or del rio, (white or river turtle;) *T. negra*, or de popal, (black or swamp turtle,) perhaps the same; and *T. de Chilapa*, (a village,) or de Chichicaste, (a very bitter *Euphorbiacæ*), which I have not seen. It is not eaten, as the former two are; the flesh is bitter and of a bug smell; their form is said to be not elliptic, but nearly round. It is believed that they feed on chichicaste. (Chichic is Mexican, and means bitter.)"

Prof. Poey has sent me from Cuba some living specimens of the *Ptychemys deoussata*, (*Emys rugosa*, Sagra, and *Trachemys rugosa*, Agass. = ♀ fide Poey,) whose habits contrast with those of the *P. ornata* and *Dermatemys*. They devour flesh eagerly, but reject bread and vegetables, unless soaked with fresh gravy, and dislike apples, the only fruit offered them.

*Chelydra* sp. Called Chiquihuan.

This variety is well marked, but that it will eventually be found to be a different species seems very doubtful. In the single individual at my disposal, the only peculiarity observable in the shell is the broader and shorter posterior sternal lobe, which scarcely measures three-quarters the anterior, and has not the gradual acumination of the ordinary variety. The axillary plates are only distinguishable upon close examination, owing to the obsolescence of the sutures. The lateral processes of the pubis are more than double the length of the median; in a specimen of the northern variety, the former are only a little longer than the latter. The skin of the occiput and neck, instead of being tuberculate, is furnished with numerous flexible dermal appendages, and one side or angle of the warts on other regions of the skin is free. The large scales of the row on the outside of the antibrachium are larger and almost entirely free, forming a broad serrate dermal border. The caudal crest is not so elevated as in the common form, but one large process being higher than long. The color of all the under surfaces is very light.

*Claudius angustatus*, sp. nov.

*Character genericus.* A single row of marginal plates. Plastron small, cruciform, solid; hyo- and hyposternal bones connate, forming an exceedingly slender bridge, which connects the plastron with the carapace, and is not covered by a corneous axillary plate, but by thin epidermis. No inguinal or gular plates; anals united. Carapace completely ossified, extending much beyond plastron anteriorly and posteriorly, elevated and narrowed in front, neither dilated nor steeply descending behind; vertebral line nearly plane. Vertebral neural segments eight, the last pair of costals meeting on the median line, but separated from the small posterior marginal by a large penultimate

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shield. Anterior in contact with a very large anterior marginal, making together eleven vertebrae in an interrupted series.

This interesting genus is nearest to *Chelydra*, though widely different; its general appearance and interrupted vertebral series approximate it to the *Cinosternidae*, especially *Aromochelys* and *Staurotypus salvini*,\* Gray. Indeed it only differs from the latter species in the immobility of the anterior lobe of the sternum, and absence of inguinal and axillary plates, as well as the presence of the mesosternal bond, if the latter belong truly to the *Cinosternidae*.† *Claudius* must be placed on the confines of the *Emydidae* in this direction, as *Chelopus* marks the extreme in the other.

*Character specificus*.—Marginal scales all very narrow, especially anteriorly; four lateral grooved; nuchal very small, transverse. Anterior vertebral longest, broad as long, posteriorly rounded, acuminate, in contact with second marginal. Third and fourth vertebrae broader than long; last narrowed above. Anterior costal  $1\frac{1}{2}$  the length of the third. Epidermoid layer rather thin, concentrically ridged anteriorly and externally on the plates; a median and lateral keel on each side, all quite weak. Sternum rounded in front, acute behind, equal portions before and behind the abdomino-preanal suture. Abdominal three-fifths of pectoro-gular plate. Above blackish brown, the plates paler medially, below yellow, unspotted.

The head is disproportionately large, and of an elongate form, with narrow postorbital arches; above plane, covered with a soft skin, except an oval plate of horn on the top of the nose. Maxillary sheath hooked in front, and with a sharp tooth below the anterior margin of each orbit; edges sharp. Mandible with a remarkably long symphyseal hook, which is received into a correspondingly deep premaxillary pit. A pair of barbels; skin of neck without warts or appendages. Toes and claws rather slender, very fully webbed; the forearm with three anterior curved corneous ridges, and the heel with four series. Tail (of ♀) very short, without terminal claw, and with a double dorsal row of skin warts.

Color blackish plumbeous, the inferior surfaces paler.

Called *Talmame* by the natives. Museum Smithsonian, 6518.

"*Talmame* lives in swamps, and digs itself in to a depth of two and three feet; eats small fish, crustaceans, snails, etc. Animal food I have found also in the stomach of *Chiquihuanu*, (entire *ampullariae*.) *Huanu* and *Pochitoque*."

*Staurotypus triporeatus*, Wagl.

Called by the natives *Huanu*.

Travellers relate that the alligator is often killed by a turtle, which he swallows alive, and which devours the intestines to get out. Heller (Reisen in Mexico, p. 313) says that he has seen a living turtle "of the genus *Cynixis*" within a fresh-killed alligator. Waldeck, whose imaginatory power exceeds far his observatory, says (in *Voyage pittoresque*) that he has found in every killed alligator's stomach a living "*Ticotea* or *potchitoqué*, which is the same known in Egypt, (thiré,) and also the *Testudo triunguis* of *Torskäl*." (1)

I have it from a number of different and reliable persons that they have witnessed the fact; either found a living *Huanu* in the body of a dead alligator, who was supposed to have run on shore and died, or even seen the *Huanu* just breaking out of the dead body of the alligator; but never any other kind of turtles; only the *Huanu*.

*Huanu* has two very distinct voices; one imitated in the name, a strong expiration in the given vowels, not intoned with the larynx, but only with the fauces and mouth,—and a squeak, like that of dry carriage wheels or of a large door. The first seems an expression of anger, when teased; the second perhaps a call, as I heard them often when at night; once alone in a corner of my house; never when male and female were near each other.

\* Proc. Zool. Soc., Lond., 1864, 127.

† Vid. Le Conte's system, Fr. A. N., 8., 1854, 182.

Mohina has a soft, melancholy piping, which is rather touching when they are killed."

*Cinosternum leucostomum*, Duméril. Arch. du Mus. 18, p.

The number of specimens of this species would indicate it to be the most abundant. Called Pochitque camatoti. The Mus. Smithsonian possesses also a specimen from Turbo, in New Grenada, from the Michler Surveying Expedition.

*Cinosternum berendtianum*, sp. nov.

Most nearly allied to the preceding, agreeing with it in the contracted rounded outline of the posterior lobe of the sternum, which fits the carapace accurately, and is without emargination, in the large size of the caudal marginals, and the absence of lateral dorsal keels. The carapace, though more or less keeled, is more depressed than in *leucostomum*, the outline rising behind, and the fixed plastron has greater longitudinal breadth.

<i>leucostomum</i> .		<i>berendtianum</i> .
Shorter than front, three-fifths of hind lobe.	<i>Middle plastron</i> ;	Longer than front, four-fifths of hind lobe.
Rounded, without external angle; a groove near upper margin.	<i>Marginal bones</i> ;	Strongly angulated.
Equilateral, bordering second marginal.	<i>First vertebral plate</i> ;	Lanceolate rarely touching second marginal.
Long as remaining median suture.	<i>Gular plate</i> ;	Two-fifths longer than remaining median suture.
Broader.	<i>Last vertebral</i> ;	Narrower.

The shell is a very dark brown above; below, a dark brownish yellow, with reddish stains on the sutures, or over portions not touching the ground. Length of carapace, 3 in. 9 l.; of plastron, 3 in. 6 l.; breadth of carapace, 2 in. 6 l. Mus. Smithsonian, No. 6,517.

Called in Tabasco, Pochitque jaquactero and negro.

"I have heard of a third *Cinosternum* in Tabasco called Pochitque huangito, (the little huau,) which is said to be smaller than the *leucosternum*, and has the same three longitudinal keels as the Huau on the upper shell." *Berendt*. Probably the *C. shavianum* (*mexicanum*, Lec., fide Agass.)

"Tortugas, Hicoteas, Mohinas and Pochitques are generally eaten in Tabasco. The *Staurotypus* is considered good enough for the Indians, who like it much, but it is despised by the whites. I had it cooked, and found it better than the *Dermatemys*. The flesh is reddish when boiled.

"I was told that, in Tabasco, *Staurotypus* and *Dermatemys* lay their eggs in November and December; *Hicotea* in February; *Pochitque* in March and April.

"*Staurotypus* lays 10 to 30 eggs; *Dermatemys*, 20 eggs; *Hicotea*, 12 to 15 eggs; the *Mojina*, *Pochitque* and *Talmame*, only a few."

On the etymological character of the native names, Dr. Berendt states as follows:—

"In Tabasco come together three languages of entirely different families; the principal language is the Chontal, closely related to the Tsental (Chiapas) and belonging to the *Maya family*,—the Zoque to the South, and the Mexican to the West. We find, consequently, a great mixture of languages in names of natural objects; besides those names introduced by the Spaniards, either from the Spanish or from the West Indian language, (Haiti, Cuba,) and applied to the same or similar things found on the continent.

"*Huau* is *Maya*. ('*Uauu—unos ga apagos d tortugas de agua dulce*'—fresh-water turtles.)

"*Chiquihuau*. *Chio* is *maya*,—means flea, (jumping *Huau*.)

"*Hicotea* or *Scotea* is 'turtle' in the Haitian language.

"*Tortuga blanca*, white turtle, (is Spanish.)

"*Pochitoque* or *Puchitoque* seems Maya. *Puch* is bark, and *tok* flint.

"*P. Jaguactero*. *Jaguacte* is a palm tree, (a *Bactris*,) standing in thick groups in low swamps, which are called *jaguacteros*.

"*P. chato*. *Chato* is Spanish; means short or upturned nose.

"*Talmame*, perhaps *Talmeme*, (a corruption of *Tlameme*, a Mexican word,) means 'carriers.'

"*Mohina* is Spanish, (anger, sadness,) though I do not see why applied to this turtle."

*Pliocercus dimidiatus*.

Tail two-fifths the total length, urosteges 120, nearly equal in number to the gastrosteges—127. Scales in seventeen rows, the median scarcely narrowed. Head very distinct, flat, muzzle truncate. Top of rostral shield round, curved back on the upper plane. Internasals very small; lateral borders of frontal (vertical) nearly parallel, a little shorter than anterior. Occipitals large. Temporals, 1 very narrow, 1 pentagonal, 2. Loreal nearly a rhomb lower than postnasal; preoculars three, upper not reaching frontal, lower cut from labial. Superior labials nine, fifth and sixth entering orbit: postoculars two, superior in contact with occipital only. Nine inferior labials, sixth largest; genials equal. Teeth equal.

Red, crossed by fourteen black rings on the body, and eight and a part on the tail. These are separated by nearly equal spaces below, and rather narrower ( $3\frac{1}{2}$  scales) above. A black space involves the nape to the tips of the occipital and last upper labial plates and all the last lower, and does not cross the jugulum. The remainder of the head above black, except the anterior part of the frontal and the first second and third superior labial shields. Lower labials bordering anterior genials, with mental, black.

From Arriba, Costa Rica. Sent by Chas. N. Riotte, correspondent of the Smithsonian Institute: Mus. No. 6363.

The species of this genus now known are four,—viz.:

Two præoculars; dentition isodont; scutella near 143+85. Color of *Elaps lemniscatus* type, red with black wings in threes separated by yellow.

*P. elapoides* m. *Elapochrus deppei* Pet. *Liophis (Cosmosophis) tricinctus* Jan.

One præocular; dentition diacranterian; scutella near 130+97. Color of the *E. corallinus* type, red with simple numerous black rings.

*P. aequalis* Salvin. P. Z. S., 1863.

Three præoculars; dentition isodont; scutella 129+120; color of the *E.* type, few approximated black rings on red ground.

*P. dimidiatus* m.

Two præoculars; dentition isodont; scutella near 138+46. Color of the *E. langsdorffii* type; broad contiguous equal black rings, leaving but lines of the red ground.

*P. euryzonus* m. *Liophis (Cosmosophis) splendens* Jan. *Coronellidæ* Arch. p. l. Zoologia Modena, 1863.

*Tropidoclonium storerioides*.

Size small, form not slender, muzzle obtuse; in general similar to *Storeria dekayi*. Scales fifteen rows; the inferior row only smooth, much broader than the others, which are narrowest medially. Scales of tail strongly keeled, in six rows. Nasals not elongate, usually entirely, sometimes half separated. Loreal trapezoidal touching the decurved postfrontals by the superior angle only, its hinder suture shortest, sometimes entering the orbit posteriorly between the two præoculars; of the latter, the inferior is the smaller. Postoculars three; in contact with one broad temporal, which separates two

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labials from the occipital. Superior labials seven, or six from confluence of two, sometimes of the third and fourth which bound the orbit. Inferior labials seven, fourth largest; postgenaeal equal pregenaeal, separated by scales. Vertical shield longer than broad, outlines straight, posterior angle less than right; occipitals nearly as long as from their border to rostrals, emarginate behind. Gastrosteges 126, 1—1 urosteges forty pair. Color olive brown (one specimen light brown), with dense, minute punctulations above and below, and about fifty-four light-edged black cross-bars extending over six rows of scales, alternating with shorter ones on the sides: both are broken into spots on the neck, where there is a large postoccipital blotch on each side.

Length of rictus of mouth, 4 lines; of head and body, 10 inches, 9 lines; of tail, 2 inches, 8 lines.

*Habitat*.—Mexican plateau between the eastern range and the valley of Mexico. Sent by our correspondent, Dr. Ch. Sartorius.

*Ancistrodon bilineatus*, Gthr. Ann. Mag. N. H. 1863, 364.

Fine specimens in Mus. Smithsonian from Western Mexico, from Guadalupe and Colima, from our correspondents, I. I. Major and Jno. Xantus. The species nearest our *A. conortrix*.

*Crotalus ravus*.

Twenty-three rows of scales, all keeled, except the exterior; keels of the median thick. Head broad in front, canthus rostralis and muzzle rounded, the latter elevated. Rostral abruptly acuminate; both pairs of frontals broader than long; occipitals well developed, their outer portion cut off wholly or in part by a suture. Temporal scales all smooth. Pit separated from labials by a series of small scales; one row between the former and orbit. Superior labials eleven and twelve, last eight nearly equal; inferiors, twelve and thirteen; gastrosteges, 147, urosteges, 26. Color yellowish brown, with from twenty-six to thirty-one elongate deep brown narrow parallelogramic spots, four scales long to five wide, and a series of as many short transverse bars on the sides *opposite* them: a series of thrice the number of small spots on the inferior rows of scales. Belly yellowish, thickly varied with blackish brown. Tail yellow brown, with but two proximal cross-bars. Head pale, similar, without spots or marks, except a minute punctulation. A brown anteriorly furcate nuchal spot.

Length of rictus, 5.7 lines; of head and body, 7 inches, 6 lines; of tail, 10.2 lines.

*Hab.*—Table land of Mexico.

The specimens in the Mus. Smithsonian are young: the species is, no doubt, small, and nearer *C. miliaris* than any other.

*Caudisona polysticta*.

The species which I call by this name reminds, at first sight, of the *Bothriechis mexicanus*, and the head markings resemble those of the South American *Trigonocephalus alternatus*. The pattern of color is, however, more broken than in either, and represents a new type in the genus.

The superciliary plates are normal; the rostral higher than broad, acuminate; two marginals between them, the anterior pair linear, separated by a small plate, the posterior broad oval, separated by two rather narrow plates. Three between the superciliaries, the outer large. Two nasals, two loreals, one above the other. Superior labials fourteen, separated from the orbit by two rows of smooth scales; inferior labials thirteen; temporals smooth. Rows of scales twenty-seven, all keeled, except the outer two. Gastrostega 123, urostega 19, the first only divided. Crepitaculum slender, acuminate, delicate for the size of the animal; joints eleven. The color above is laterally gray brown, medially yellowish brown, marked by seven longitudinal

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series of brownish black spots. These alternate; the inferior involves the tips of the gastrosteges; the median embraces the largest spots, eight and nine scales wide, which are occasionally subdivided, the halves alternating. The tail is brown, crossed by three pairs of dark brown bars. Lips pale, with a spot below the pit, and one from behind the eye to near the canthus of the mouth. A dark band convex forwards extends between the eyes, and is continued below the eye nearly to the labial border. A pair of blackish bands form a V-shaped figure, the limbs diverging over the temples, each followed by a spot: two small round spots in the angle of the V, and a broad divergent band from the occiput on each side of the nape. Below pale, each scute with a broad basal border of blackish spots and punctulations.

Length of rostrum of mouth, 11 lines; breadth between eyes 5 lines; length of tail,  $15\frac{1}{2}$  lines; of rattle, 13 lines; total, 23 inches, 9 lines.

*Habitat*.—Table Land, Mexico.

In the related *C. triseriata*, there are twenty-three rows of scales, a broader front, and different coloration.

*Laemanctus alticoronatus*.

Posterior outline of cephalic casque nearly vertical; its lateral borders ascending from the parietal plane, and furnished with six corneous processes or horn-like scales on each side (each once or twice constricted). Two scales on canthus rostralis; two between them and labials, and two between nasal and orbit. Nine upper labials, ten lower, infralabials broad as long, nearly smooth. Four between second labials. Scales all keeled, fifty-one in a ring round the body, dorsals a little larger than laterals, scarcely smaller than ventrals. A few elevated vertebral scales on nape and interscapular region, the latter equal dorsal scales; no further crest. Four pairs of supranasal plates, posterior largest, lateral parietal much larger than median. Forelimb extends from wrist to nostril; posterior limb heel to neck fold. General color chestnut, with five deep brown dorsal cross-bars (last sacral) and a narrow yellow band from loreal region to groin, bounded above, from orbit to tympanum, by black and chestnut. Muzzle and front above, with lower surfaces "emerald to pale malachite" (Schott), limbs scarcely banded, darker; lumbar and inguinal regions yellow.

End of muzzle to end of casque, 14.2 lines; anterior limb, 22.8 lines; axilla, 18.8 lines; throat to top of casque, 9.2 lines; vent, 3 inches, 4.5 lines; vent to end of tail, 11 inches, 8 lines; vent to end of hind limb, 3 inches, 4.5 lines.

*Habitat*.—Yucatan, near Merida. Collected by Arthur Schott, naturalist of the Comision Cientifica de Yucatan, under authority of D. Jose Salazar Starregui, Governor of that country.

Called Yaxtoloo Maya, Coll. No. 308. Nearly allied to *L. serratus*. Cope, Pr. A. N. S., 1864, p. 176.

*Sphaerodactylus glaucus*.

Dorsal scales very small, but flat, rounded, smooth; about ninety series round the body; abdominals larger, rounded, about forty-four rows from vent to axilla, continued larger on under side of tail (not reproduced in this specimen). Labials  $\frac{3}{4}$ , three scales bordering mental. Supraorbital mucro present, orbit equal from its border to, or little beyond, nostril; muzzle and front gradually acuminate. Auricular meatus smaller than digital palette. Above light brown, "greenish stone color or glaucous" in life, with minute paler spots and dark vermiculations; below whitish. Tail in life orange, more intense toward tip; in spirits with two yellow black-edged spots near tip, and one on each side the origin. Limbs and digits annulated with yellow, black bordered.

Muzzle to axilla, 5.5 lines; Muzzle to vent, 11.6 lines; vent to end of tail, 10.4 lines.

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*Habitat.*—Near Merida, Yucatan. Coll. Comision Cientifica under Arthur Schott.

Allied to the *cinereus* and *sputator*, and somewhat intermediate between them. The second from Mexico.

*Pharyngodon petasatus*.

*Char. Gen.*—Fam. Hylidæ. No fronto-parietal fontanelle; prefrontals extensively in contact anteriorly, developed into an angulated preorbital crest. Corium entirely involved in the ossification of the cranial bones, to which the epidermis is closely adherent. Tympanum distinct; vomerine teeth present, a longitudinal series on the parasphenoid bone, tongue round, but little free. Digits normal, the posterior webbed.

This genus is strictly a member of the Hylidæ, as lately defined,\* and allied to *Trachyocephalus*; the character in which it differs from that genus, and which is unique in the whole order of Salientia, is the presence of a longitudinal series of teeth on the parasphenoid bone. If this point is unique, the physiognomy of the animal is equally so, its profile resembling that of *Aëtobatis*, or some allied genus, more than anything else in the animal kingdom. This results from the extraordinary development of the canthus rostralis, which forms a transverse wing entirely across the muzzle, and prominent angular process in front of and continuous with the superciliary border; and the more excessive prolongation of the angular outline of the maxillary and premaxillary bones. The latter projects in a more convex arc than the outline of the former, and as far beyond the mouth as the external nostrils are in advance of a line connecting the orbits. The mouth is, therefore, very inferior, its margin being a little behind the opening of the aforesaid nares. The outlines of the muzzle are recurved and serrate, leaving the loreal region as a gutter, overhung by the canthus rostralis. Straight sutural grooves outline all the bones of the cranium, as in *Trachyocephalus scutigera*, leaving the ethmoid plate nearly an obliquely placed square. The border of the cranial casque is a straight line just behind the tympanum, elevated, continuous, and serrulate. A strong ridge passes over the tympanum and joins on bordering the orbit. Supercilia much elevated, eyes large, directed nearly forward, protected behind by a large development of the united palpebræ, the opening about three times the size of the tympanum. Between supercilia proper equal from occipital crest to union of canthus rostralis; from latter to premaxillary border, one half the same. Breadth between maxillary ridges at canthus oris less than length of casque, and three and a half times into total length. Vomerine teeth in two rounded ridges nearer each other than to the nares, and behind posterior border of latter. Parasphenoid series simple, as long as from nostrils to premaxillary border.

Abdominal areolæ wanting on breast and gula, but extending on prebrachial and lateral regions, otherwise nearly smooth. Tibia half the length to orbit; foot rather short, digits stout, web measuring three-fifths of the longest. Fingers free, stout; dilations not broad.

Above ashen olive, with many irregular brown spots; external surfaces of limbs barred with the same. Head blackish, with white punctulations. Below uniform ashy white.

Length of cranium, 12.1 lines; of body from casque, 24.2 lines; from axilla to wrist, 10.1 lines; of hand, 8 lines; femur, 12 lines; tibia, 14 lines; foot, 19.3 lines.

*Habitat.*—The vicinity of Mérida, Yucatan. A ♀ specimen, No. 363 of the collection made by authority of José Salazar Starregui, Governor of Yucatan, by Arthur Schott, Naturalist of the Comision Cientifica de Yucatan.

According to the notes of Arthur Schott, this animal was taken from a hole in the rocky wall of the Cenote Pamanche, on the new road to Progreso.

\* Nat. Hist. Review, London, 1866, p. 106.

It is interesting that an animal living in rocky situations should present such a singular cranial bony development: this, in connection with its colors, no doubt, aids especially in concealment, and is another instance of the Creator's bountiful care for his humblest creatures.

It will be useful here to present a synopsis of the genera of Hylidæ.

I. No Frontoparietal fontanelle.

- α. Cranium above connate with a dermoossification; prefrontals in contact.

A series of parasphenoid teeth; no dorsal pouch..... Pharyngodon.  
 No parasphenoid teeth; no dorsal pouch..... Trachyocephalus.  
 No parasphenoids, a dorsal dermal pouch..... Opisthodelphys.  
 αα. No cranial dermoossification.

- β. A dorsal dermal pouch.

Toes slightly webbed..... Nototrema.

- ββ. No dorsal pouch.

- γ. Prefrontals united by suture.

Two longitudinal cranial carinæ; no gland..... Osteocephalus.

No carinæ; a parotoid covering head and back..... Scytopsis.

No carinæ or parotoid; prefrontals large..... Acrodytes.

- γγ. Prefrontals small, separated by ethmoid.

No keels or glands; ♀ a coccygeal diapophysis..... Dryomelictes, *g.n.\**

II. A frontoparietal fontanelle.

- α. Posterior digits free, opposable, two and three.

Parotoid glands present; tongue elongate free..... Phyllomedusa.

- αα. Posterior digits on same plane not opposable.

- β. Posterior digits webbed, prefrontals separated by the large ethmoid plate.

- γ. Brain case and fontanelle broad; superior ethmoid plate broad; inner finger not opposite to the others.

- δ. An elongate acuminate flat postorbital process of the frontoparietal bone.

Form stout..... Smilisca, † *g. n.*

- δδ. No postorbital process.

Tongue elongate, extensively free; inferior palpebra reticulate with white fibres: vomerine teeth..... Agalychnis.

Tongue short, attached or little free; palpebra usually transparent; vomerine teeth..... Hyla.

Tongue short; palpebra transparent; no vomerine teeth..... Hylella.

Tongue extensively free; dilatations minute, palmation extensive behind; vomerine teeth..... Acris.

- γγ. Brain case and ethmoid elongate, fontanelle narrow; inner finger opposed to the others.

Tongue slightly free..... Litoria.

- ββ. Posterior digits free.

Superior ethmoid plate osseous; prefrontal bones separated..... Chorophilus.

Superior ethmoid plate cartilaginous, the prefrontals developed, in contact medially..... Thoropa.

*Hyla gracilipes.*

Tongue elongate, free one-third its length. Inferior palpebra not veined.

\*Type *Hyla aurantiaca auctorum.*

† *S. daulinia*, sp. nov. This species I only know from a skeleton in the private anatomical museum of Hyrtl, Professor of Anatomy in the University of Vienna. The head is a little broader than long; the interorbital width greater than from external nares to orbit; vomerine teeth in short transverse series; general form similar to the *Acrodytes venulosus*.

Fingers elongate, free; toes webbed at base only, remarkably elongate, the foot from tarsus a little longer than the tibia, and equal from axilla to middle of origin of femur, the width of head. Head flat, longer than broad, eyes little prominent, one-half tympanic disc; canthus rostralis little concave. Body elongate, skin entirely smooth above: vomerine teeth in two almost connate fasciuli which present a convexity to each narial opening and posteriorly where they are opposite the hind outline of the latter. Sacral diapophyses much dilated, presenting a prolongation posteriorly.

Length of fore limb, 9 lines; posterior limb, 24.4 lines; from end of muzzle to behind tympanum, 4.4 lines; muzzle to vent, 15 lines.

Color above, bright leek green, with a brown band from the nostril through the tympanum to the middle of the side, white-bordered above; and a short band on each side the ilium, white-bordered. Femora not spotted behind; limbs not cross-banded. Upper lip with a brown border; its green becoming yellow under the tympanum. Below whitish.

*Habitat*.—Mexican table land, north-east of city of Mexico.

A species near in technical characters to the *ewingii*, *regilla*, and *squirrella*, but abundantly distinct from all, in its sacrum, feet, head, etc.

#### *Hyla staufferi*.

Tongue rounded, a border only free; a large gular vocal-vesicle; vomerine teeth in fasciuli between nares, which are a little larger than the choanæ. Digits all short, with pallettes large; the anterior free, the posterior short, the palmation measuring half the length of the longest digit. The heel extends to in front of orbit. Head plane, depressed, muzzle very prominent, rounded. Outline from above elongate oval, canthus rostralis weak, straight, lores flat, oblique.

Length of orbit equals frontal width. Skin of sides rugulose, otherwise smooth above; no appendages. Muzzle to rictus oris, 4 lines; anterior limb, 6.4 lines; muzzle to vent, 11.7 lines; posterior limb, 17.1 lines.

Color above dark olive, with a short longitudinal black bar over each scapula; and one from eye to eye, with a trace along the coccyx. Below yellowish, deeper to brown on the extremities. Upper lip olive, sending a pale line to near axilla, sides minutely varied with dorsal and ventral tints.

*Habitat*.—Orizava, Mexico. Obtained by Prof. T. Sumichrast.

The species sent from Orizava by Prof. Sumichrast to the Smithsonian Institution are:—

*Spelerpes chiropterus*.  
*Geotriton carbonarius*.  
*Hyla baudinii*.  
*Hyla staufferi*.  
*Hyla miotympnum*.  
*Hylodes conspicillatus*.  
*Bufo valliceps (nebulifer, Gird.)*  
*Rana sp.*  
*Sceloporus*.  
*Sceloporus*.  
*Sceloporus*.  
*Anolis nannoles*.

*Corythaeolus cristatus (Thysanodactylus, Gray, Dracontura, Hallow.)*  
*Gerrhonotus gramineus*.  
*Diploglossus steindachneri*.  
*Oligosoma gemmingeri*.  
*Catostoma semidoliatum*.  
*Ninia collaris*.  
*Ninia diademata*.  
*Coniophanes fissidens (Glaughrophis lateralis, Jan Elenco.)*  
*Spilotes poecilonotus*.  
*Atropus undulatus*.

#### *Hemidactylum pacificum*.

This species is of some interest, inasmuch as our native species of this genus has hitherto been the only representative of its form. It differs from this in its uniform brown color above and below, and in some more important points. Vertebrae and costal folds between axilla and groin, seventeen, the latter not prolonged dorsally, as in the *scutatum*. Head oval, elongate, lip rounded, eyes large, prominent, longitudinal diameter longer than length of muzzle. Muzzle to humerus, half length from latter to groin. Tongue elongate oval;

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sphenoid teeth approaching near to the short oblique series of vomerines. Fore limb to orbit, hind limb scarcely longer, reaching the eight fold from behind. The inner digit on both extremities is so short, as to render the numbers almost 3-3. Tail elongate, slender subcylindrical. Gular fold represented by a line.

Length of head to angle of mouth 2.5 lines. Breadth of head behind eyes 2 lines. From muzzle to humerus 5 lines. From muzzle to groin 16.5 lines. Length of tail 17 lines. Length of posterior limb 3.5.

*Hab.*—Santa Barbara, on the coast of Southern California. Sent to the Smithsonian Institution by Dr. Hays.

*Spelerpes cephalicus*.

With the present addition to the Batrachian fauna of tropical America, it is appropriate to enumerate the salamanders so far known from this region. They are mostly natives of the mountainous sections, or of that elevated plateau which presents us with most of the northern forms found in Mexico.

*Geotriton\* carbonarius*, Cope, Pr. Ac. Nat. Sci., Phil., 1860, 373. North Eastern Mexico.

*Geotriton adpersus*, Peters, Monatsber. Acad. Berlin, 1863, 466. Bogota, New Grenada.

*Spelerpes cephalicus*, sp. nov. Table Land, Mexico.

*Spelerpes orculus*, sp. nov. Table Land, Mexico.

*Spelerpes chiropterus*, Cope, Pr. Ac. Nat. Sci., 1863, p. 54. North Eastern Mexico.

*Spelerpes bellii*, Gray, Cat. Brit. Mus., 46, 1850. Cope, l. c., 1860, 372. North Eastern Mexico.

*Spelerpes lineolus*, sp. nov. Table Land, Mexico.

The form of the present species is more that of *Amblystoma opacum*, and is the shortest and stoutest seen in the genus. Muzzle rounded, truncate, with obtuse angles at the nares, its length from line connecting anterior canthus oculorum equal length of eye. Distance between these canthus equal from hinder canthus to nares. Breadth behind orbits equal length of tibia and foot. Muzzle to axilla equal  $\frac{1}{2}$  distance from axilla to groin. Costal folds (i. e., dorsal and lumbar vertebræ) eleven. Tail swollen, little compressed, constricted at base. Posterior limb stout, extending to sixth fold from behind; toes flat, depressed, margined, inner very rudimental. Inner and outer digit of anterior limb similar; the longest extend to the middle of the orbit. Series of vomerine teeth nearly straight, not in contact. A post gular fold. Skin everywhere finely wrinkled. Color dull black, paler on the sides; lips and gular region minutely marbled with ashen.

Length of rictus oris 2.75 lines. Length to axilla 6.8 lines. Length to groin 16 lines. Length of tail 15 lines. Length of hind limb 5.2 lines.

*Habitat.*—Mexican Table Lands, Dr. C. Sartorius.

*Spelerpes orculus*.

Form like that of *S. chiropterus*, (the inner digits being similarly rudimental) but stouter, a body of equal length being thicker, and the head and neck longer and larger; the lip is not angularly truncate, and the color is uniform black. Costal folds eleven. Head elongate, broader behind; muzzle rounded, truncate, lip rounded; eyes little prominent; length of orbit equal from orbit to nostril, and greater than between their anterior canthi. Anterior digits to middle of orbit; posterior extends to the sixth from the groin. Tail compressed, flat above. The digits are all short and flattened, not palmate. Series of vomerine teeth very oblique, in contact medially. Postgular fold distinct.

From end of muzzle to postgular fold 3.8 lines. From end of muzzle to ax-

\*The genus recently named, by Du Bocage, *Chiloglossa*, P. Z. R., 1864, p. 264, appears to be not different from *Neurergus*, Cope, Pr. A. N. S., 1862, 343.

illa 5·4 lines. From end of muzzle to groin 13·9 lines. From groin to end of tail 21·1 lines. Length of hind limb 4·4 lines.

*Habitat.*—Mexican Table Land, Dr. C. Sartorius.

*Spelerpes lineolus.*

The species has the general form of *Batrachoseps attenuatus*, but, as the number of digits is as in *Spelerpes*, I retain it for the present in that genus. Form very slender; fourteen costal folds from femur to axilla, the first at the femur. Muzzle short, rather thick, regularly rounded; eyes large, diameter equals frontal width between middle supercilia, longer than length of muzzle. A delicate linear supraoccipital crest on the cranium. Limbs very small, each extending backwards or forwards over but two costal folds. Digits obtuse, rudimental; no web. Tail compressed, slightly flattened above and below, two and a half times length of body. Head to axilla a little less than half from axilla to groin. A delicate postgular fold. Color, above and below, uniform glossy black.

Length from end of muzzle to rictus oris 1·4 lines. Length from end of muzzle to axilla 3·8 lines. Length from axilla to groin 8·2 lines. Length from groin to end of tail 20·4 lines. Length of anterior limb 1·2 lines. Length of posterior limb 1·5 lines.

*Habitat.*—Table Land of Mexico. Dr. Chas. Sartorius.

The species sent by Dr. Sartorius to the Smithsonian Institute, are as follows:

<i>From near Vera Cruz.</i>	<i>From Table Land and Southern Mountains.</i>
<i>Spelerpes chiropterus</i> , s. n.	Siredon, sp.
<i>Spelerpes bellii</i>	<i>Spelerpes cephalicus</i> , s. n.
<i>Geotriton carbonarius</i> .	<i>Spelerpes orculus</i> , s. n.
<i>Hyla miotypanum</i> , s. n.	<i>Spelerpes lineolus</i> , s. n.
<i>Hyla baudinii</i> .	<i>Hyla gracilipes</i> , s. n.
<i>Rana</i> , sp.	<i>Hyla miotypanum</i> , var.
<i>Sceloporus</i> .	<i>Rana montezumæ</i> * ( <i>mexicana</i> , Rüppel.)
<i>Sceloporus</i> .	<i>Sceloporus</i> .
<i>Lamaneotus longipes</i> ,	<i>Sceloporus</i> .
<i>Corythæolus vittatus</i> .	<i>Sceloporus</i> .
<i>Anolis biporcatus</i> .	<i>Anolis biporcatus</i> .
<i>Gerrhonotus tessellatus</i> .	<i>Gerrhonotus</i> .
<i>Ameiva undulata</i> .	<i>Ameiva</i> .
<i>Boa eques</i> .	<i>Ameiva</i> .
<i>Catostoma semidoliatum</i> .	<i>Plistodon lynxæ</i> .
<i>Tantilla miniata</i> , s. n.	<i>Catostoma semidoliatum</i> .
<i>Stenorhina ventralis</i> .	<i>Catostoma chalybaeum</i> .
<i>Ophibolus polyzonus</i> , ( <i>Coronella formosa</i> , Schleg.,) s. n.	<i>Tantilla</i> .
<i>Diadophis stictogenys</i> , ( <i>D. texensis</i> , Kenn.)	<i>Ophibolus micropholis</i> .
<i>Ninia collaris</i> .	<i>Rhadinæa decorata</i> .
<i>Ninia diademata</i> .	<i>Pliocercus elapoides</i> .
<i>Chersodromus Hebmanni</i> .	<i>Thamnophis</i> .
<i>Thamnophis</i> , sp.	<i>Thamnophis</i> .
<i>Spilotes auribundus</i> , † s. n.	<i>Tropidoclonium storerioides</i> , s. n.
	<i>Arizona deppel</i> , ( <i>lineaticollis</i> , Cope.)
	<i>Drymobius margaritiferus</i> .

\* The species from Natal, supposed by me to be *R. mascariensis*, from Natal, Pr. Acad. Phil., 1862, 340 is very different, and may be called *R. spinidactyla*.

† The so-called diacranterian and allied genus *Steganotus*, D. B., has but a slight development of the posterior tooth, and might be as well considered coryphodont. Günther's *Lielaphis* is identical.

- Tropidodipsas sartorii*, (*Leptognathus* *Himantodes cenchos.*  
*dumerili*, Jan Elenco,) s. n. *Elaps*, sp.  
*Sibon septentrionale* et var. *Trigonocephalus atrox.*  
*Himantodes leucomelas*, s. n. *Crotalus ravus*, s. n.  
*Elaps elegans.* *Caudisona polysticta*, s. n.  
*Trigonocephalus atrox.*  
*Bothriechis mexicanus.*

A Contribution to a Knowledge of the DELPHINIDÆ.

BY E. D. COPE.

Thirty specimens of species of this family at my disposal indicate twenty-two species, of which ten are in the Museum of the Academy. They are:  
*Monodon monocerus*. Specimens from Drs. Hayes and Kane; the latter complete.

*Beluga catodon*. Three complete skeletons, from Drs. Kane and Hayes.  
*Phocaena*, undetermined.

*Globicephalus intermedius* Gray, Harlan. Jour. Acad. Nat. Sci., 1829, 51; Gray, Catalogue B. Mus.

One specimen from Cape Cod, Mass., kindly lent me from the Mus. Salem, Mass., (No. 223,) through my friend F. W. Putnam, indicates a form differing little from the European *G. melas*, or Pilot Whale.

The muzzle from the maxillary notch is longer, and the premaxillaries a little narrower on its terminal two-thirds than represented by Cuvier's plate (*Ossemens Fossiles* 222), or Gray's measurements of the *melas*. Like the *melas*, it is characterized by the straightness of the plane between the foramen magnum and the supraoccipital crest, by the large exposure of the vomer to beyond the maxillary notch, and of the inner portion of the maxillaries from the nasal meatus to opposite the notch. The concavity of the cranium at this point is 1 in. 4 l. below the plane connecting maxillary alæ at the notch, and the intermaxillaries fall very much out of view, except on the terminal half of the muzzle.

In this specimen the supraoccipital crest and spine and the protuberance of the nasal bones are remarkably developed; and the palatines and pterygoids regularly rounded and without angle in section.

	In. Lines.
Length from end of muzzle to occipital condyle.....	24 6
“ “ “ to maxillary notch.....	13 6
“ “ “ to occipital crest.....	22 4
“ from occipital crest to foramen magnum.....	6 2
Breadth of muzzle at middle.....	7 2
“ “ at notch.....	9 3
“ of premaxillaries at front of blow hole.....	6 4
“ between orbits.....	15 4
“ “ temporal crests.....	11
Elevation of nasals above maxillary plate.....	2 6
Teeth.....	9 or 10

*Orca meridionalis* Flower, Proc. Zool. Soc. London, 1864, 420.

A muzzle and jaws of this formidable tyrant of the Australian seas are in the Mus. Salem, Mass., unfortunately without locality. The specimens in its museum are derived from the merchant vessels which trade between that port and various parts of the world.

The form is massive, and agrees closely with the description and figure above cited; the end of the muzzle is perhaps a little more arched. The outline is more acuminate and the intermaxillaries broader, the mandibular rami

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are narrower, and the end of the muzzle more prolonged into an edentulous beak than appears in Prof. Reinhardt's figure, in his memoir on *Orca crassidens*.

The triangle extends to opposite the posterior tooth; the premaxillaries below, to opposite the third from behind. At the latter point the width of the intermaxillaries is double the width from their border to the plane of that of the maxillaries, and it increases from that point to the end of the muzzle, where they are rugose and decurved. Teeth  $\frac{9}{10}$ , very strong, cylindrical, and incurved, except the posterior superior, which is weak and straighter.

	In. Lines.
Breadth of muzzle at notch.....	8
“ “ at fifth tooth.....	6 6
“ “ at anterior tooth.....	3
Length from notch.....	12 8-8
“ of ramus mandibuli from condyle.....	20
“ of series of mandibular teeth.....	9 8
“ gonys.....	3 7
Depth of ramus behind last tooth.....	2 9
“ “ at coronoid process.....	5 5

*Lagenorhynchus leucopleurus* Gray.

One cranium Mus. Academy, loc. unknown, with long styloid process and deciduous maxillary teeth.

	In. Lines.
Length from end of muzzle to occipital condyle.....	13 8
“ “ “ to supraoccipital crest.....	11 6-8
“ “ “ to maxillary notch.....	6 11
“ of temporal fossa.....	2 8
“ of styloid bone.....	3 1-8
Breadth at middle of muzzle.....	2 7
“ at notch.....	3 10
“ of nasal meatus.....	2 1-4
“ between postorbital processes.....	7 8
“ “ temporal ridges.....	6 5-8
Teeth.....	27

*Delphinus tursio*, Fab. A half grown specimen, judging from the distinctness of the epiphyses. Though differing in various points from the description of Cuvier, the most exact we possess, the peculiarities can be mostly ascribed to immaturity. The specimen is complete, and is supposed, with some degree of probability, to have been taken on our coast.

Breadth of muzzle at notch, two and one-sixth times its length; latter distance, five-ninths total length of cranium. Occiput fuller in profile than in Cuvier's figure, and considerably broader when viewed from above: this breadth enters length of cranium two and one-sixth times. Parasphenoid also not excessively prominent. Vertebrae C. 7, D. 11, L. 22, to first pierced laterally; C. 13. Eleven pairs of ribs. Cuvier gives D. 13, L. & C. 38, and thirteen pairs of ribs. It is evident that six vertebrae have not been lost from our specimen, though some may be wanting, and possibly one pair of ribs: the limit of variation in this respect among the dolphins is not known.

Compared with Cuvier's figure, the diapophyses of the atlas are narrower and more acuminate, and the superior and inferior processes of the fifth cervical vertebra less developed and convergent. The dorsal diapophyses are thinner, and destitute of a marked anterior ridge. In the twelfth caudal the chevron bone is as large as the neural spine in profile. The anterior sternal piece is less emarginate and not laterally projecting in our specimen: the posterior

\* K. Danske vid. Selakab. Forhandl. 1862, 104.

piece is cartilaginous, with the anterior fourth alone ossified. The trifling differences in the scapula would probably vanish with age, as the less extent of the superior and supero-anterior outline. Teeth acute, incurved.

Length from end of muzzle to notch.....	9 in.
“ (straight) from end of muzzle to occ. condyle.....	17 “
“ “ “ atlas to last dorsal .....	14.25 in.
“ “ “ “ caudal.....	40 in.
“ of anterior limb.....	9.75 in.
“ of scapula.....	6.5 “
Height of “ .....	4.5 “
Breadth of occiput between temporal crests.....	7 in.
“ muzzle at notch. ....	4 “
“ “ middle.....	2.75 in.

Other characters are apparent in the following comparison:

- A. Palate without lateral grooves: teeth  $2\frac{3}{2}$ .  
 Premaxillaries forming an elevated, rounded ridge..... *tursio*.
- B. Palate do.: teeth 34—42.  
 a. Outline from foramen magnum to frontal crest nearly straight.  
 Diameter of temporal fossa, made longer than preorbital process; muzzle flat; paroccipital most curved outward and developed; width of muzzle at notch two and a half times in length..... *clymene*.
- aa. Outline from foramen to crest curved, cranium rounded; temporal fossa much longer than preorbital process.  
 Occiput rounded, broad; paroccipital well developed; triangle to tooth line. Muzzle shorter,  $2\frac{1}{2}$  its width at notch, flat at the end, premaxillaries a high ridge medially..... *doris*.
- Occiput rounded; paroccipital ala strongly curved outwards; width of flat muzzle at notch two and a half times in length. Triangle short..... *styx*.
- Occiput elevated; paroccipital ala very little developed; muzzle flat, narrow; width at notch nearly three times in length; triangle long..... *asthenops*, var.
- Occiput broad, subtruncate, prominent behind the temporal fossæ; width of muzzle at notch two and a half times or less in length; frontal regions broader—otherwise as last. *asthenops*.
- aaa. Supraoccipital rounded in profile; diameter of temporal fossa shorter than preorbital process.  
 Muzzle very flat,  $2\frac{1}{2}$  times breadth at notch; a keel in front of nasal meatus..... *crotaphiscus*.
- C. Palate do.: teeth 48—54.  
 Muzzle ridged by the elevated premaxillary bones; width at the notch one-fourth the length; triangle short; occiput rounded; teeth below 49—51..... *microps*.
- D. Palate with deep lateral grooves.  
 Teeth  $4\frac{2}{3}$ ; occiput rounded; premaxillaries forming an elevated angular ridge, subtrigonal in section; paroccipital little developed. Smaller nasal meatus..... *delphis?* var.  
 Teeth 37—42; occiput short, rounded; breadth of muzzle to length as 1:  $2\frac{1}{2}$ ; premaxillaries forming a rounded ridge.  
 Larger nasal meatus..... *delphis*.
- The form of the fossa of the orbitosphenoid which is overhung by the plate

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of the maxillary, appears to coincide to some extent with other peculiarities of the species. It appears under the following modifications :

- a. Deep, enclosed, so as to be a blind canal ;  
*D. doris*, *clymene*.
- β. Shallower, open, but strongly marked ;  
*D. styx*, *Delphinapterus peronii*, *D. delphis*, (less marked.)
- γ. Very shallow, little marked ;  
*D. asthenops* et var., *microps*, *crotaphiscus*.

*Delphinus doris* Gray, Catal. Brit. Mus. Zool. Erebus, Terror tab.

One specimen, habitat unknown, from the Museum at Salem, Mass., agrees closely with Gray's indications, with, however, a shorter occiput than represented in his figure. The triangle is marked with numerous curved grooves which converge, and are convex, backwards. The cranium is quite as heavy as that of the *tursio*. The sella turcica is more strongly marked than in the other species, and the processus olivaris much more prominent and solid. The basioccipital is not grooved for the medulla oblongata ; the paroccipital sinæ are well developed. The glenoid cavity sends a groove upwards on the inner border of the squamosal process, but its inner border is not prolonged into an extended lamina towards the sphenoid bounding the petrotic elements in front, as in the *Delphinapterus*. The palatines have not the strong external ridge seen in the latter and the *D. crotaphiscus*. Teeth

	in.	lines
Length from end of muzzle to convexity of occ. condyle.....	16	4
“ “ “ notch.....	9	9
“ from notch to middle of occipital crest.....	5	4
“ of gonys.....	1	11
Width at notch.....	4	
“ at postorbital processes .....	7	10
“ between temporal crests.....	6	5

*Delphinus clymene*, Gray, Cat. Cetac., p. 115. Zool. Erebus & Terror, 39.

That this species is an inhabitant of the coasts of the United States, is proven by the specimen in the Museum of the Academy from off New Jersey, presented by John Krider, of this city. Its peculiarly flat occiput distinguishes the cranium at once from that of its congeners ; in other respects it is not unlike the *styx* of our collection.

Length of muzzle to notch.....	11.25	in.
From end of muzzle to foramen magnum.....	18	“
Length of gonys.....	1.5	“
“ from notch of muzzle to foramen magnum.....	6.25	“
“ “ foramen magnum to occipital crest.....	4	“
Breadth between temporal ridges.....	6.5	“
“ “ angles of mandible.....	3.87	“
“ at notch of muzzle.....	4.25	“

*Delphinus styx*, Gray, l. c. 117. Zool. E. T., pl. 21.

One cranium, Morton collection. Habitat unknown.

Length from end of muzzle to notch.....	10	in.
“ “ notch (straight) to foramen magnum.....	7	“
“ “ “ to occipital crest ..	5	“
“ of gonys .....	1.75	in.
Breadth at notch of muzzle.....	4.25	“
“ between temporal ridges (straight).....	6.75	“
“ “ angles of mandible.....	3.50	“

*Delphinus asthenops*, sp. nov.

Two crania of this species before me are light and rather slender, though 1865.]

less so than those of the *D. euphrosyne* and *microps*. The muzzle, though convex in section, is more depressed than in any of the other species, especially opposite the posterior extremity of the dental series. The acuminatę basal triangle extends an inch or more beyond this point. The premaxillaries are in one specimen quite continuous with the surface of the maxillaries; in the other specimen, a slight groove marks the suture. The blow-holes are rather small, and the nasal bones prominent. The breadth and depression of the occipital region is the most striking feature. The temporal crests are as far apart as one-half the length of the muzzle measured in front of the blow-holes, (in the variety below it enters two and two-fifth times,) and the outline of the occiput between them nearly transverse. Its breadth is more than double the height of the occipital crest above the foramen magnum, (one-half in the variety.) The frontal bones are broad and large; the width at the blow-holes enters the length of muzzle from the same point one and three-fifth times; in the variety very nearly twice. These differences are not greater than occur in human skulls, yet it is probable that in a state of nature they accompany other differences, which are together preserved isolated, indicating the existence of species. The gutter between the occipital condyles is narrow. In one specimen (596) the anterior basi-occipital suture is but little concave; in the second, (595,) its sphenoid portion is a little distance behind its pterygoid, while in the variety (499) the sphenoid encroaches much more upon the occipital. In the latter, the supraoccipital crest is slightly developed; in a *sthenops*, (595,) a larger individual, it is more so, though slight; in 596, neither it nor the temporal crest exist. In this the muzzle is a little shorter; it is evidently a younger individual of a larger specimen than the variety. The following measurements will explain their other features:

	596	595
Length from notch to occipital condyle.....	5 $\frac{7}{8}$ in.	5 $\frac{7}{8}$ in.
“ “ “ to middle supraoccipital crest...	4 $\frac{7}{8}$ “	4 $\frac{3}{4}$ “
“ “ “ to end of muzzle.....	9 $\frac{1}{2}$ “	9 “
Width of muzzle at notch.....	3 $\frac{4}{10}$ in.	3 $\frac{3}{10}$ in.
“ “ at middle.....	2 “	1 $\frac{8}{10}$ “
“ between outlines of frontal expansion.....	6 $\frac{3}{4}$ “	6 $\frac{1}{4}$ “
“ “ temporal crests.....	5 $\frac{3}{8}$ “	5 $\frac{1}{4}$ “
“ across blow-holes.....	1 $\frac{3}{8}$ “	1 $\frac{1}{4}$ “
Length of gony.....	1 $\frac{1}{4}$ “	1 $\frac{1}{4}$ “
Teeth.....	3 $\frac{5}{8}$	4 $\frac{2}{3}$

The above measurements are to be understood as made in right lines. The muzzle of the *sthenops* is less elongate, with the premaxillaries much more depressed than Dr. Gray represents to be the case in his *D. euphrosyne*, (Zool. Erab. and Terror, t. 22.) and the number of the teeth is considerably less than in his *D. slope*. The habitat is not known.

The cranium representing the variety above mentioned may really belong to another species. It differs from the *euphrosyne* in the longer triangle, muzzle, and gony, (and smaller number of teeth). It differs from our specimen of the *styx* in the smaller size, obsolete orbitosphenoid fossa, longer triangle, and longer gony. The last measures four-fifths of the width at the notch; in the *styx* one-half or less. Habitat unknown; from the Morton Coll.

	499
Length from notch to occipital condyle.....	5 $\frac{1}{2}$ in.
“ “ “ middle of supraoccipital crest.....	4 $\frac{1}{2}$ “
“ “ “ end of muzzle.....	9 “
Width of muzzle at notch.....	3 $\frac{1}{2}$ “
“ “ middle.....	1 $\frac{1}{2}$ “
“ between outlines of frontal expansions.....	5 $\frac{1}{2}$ “
“ “ temporal crests.....	5 “

Width across nasal meatus.....	1 $\frac{1}{8}$ in.
Length of gonys.....	2 $\frac{1}{2}$ "
Teeth.....	3 $\frac{7}{8}$

*Delphinus crotaphiscus* sp. nov.

This species belongs to the same group as the *styx*, *euphrosyne*, (?) and *asthenops*, resembling most especially the last. Its prominent features are the flat muzzle, with carina in front of the blow-holes, the very small temporal fossa, and the shallow trace on each side of the roof of the month, of the groove so prominent in the delphis group.

The paroccipital *alæ* are moderately developed. The glenoid cavity sends no gutter on the inner border of the squamosal process, but its inner margin is produced into a lamina, which is weaker than in the *Delphinapterus*. Palatines terminating next the orbitosphenoids in a free keel, and with a strong lateral keel. Occiput broad, rounded, short. Basisoccipital groove and sellæ turcica shallow; corpus olivare represented by a transverse ridge. Triangle extending beyond the line of posterior teeth.

	In.	Lines.
Length from end of muzzle to occipital condyle.....	16	
“ “ “ to notch.....	10	
“ of gonys.....	2	
Breadth at notch.....	3	9
“ at middle of muzzle.....	2	1.5
“ at postorbital process.....	7	7
“ between temporal crests .....	5	6
Teeth.....		4 $\frac{2}{3}$

*Habitat*.—Unknown. Mus. Salem, Mass. F. W. Putnam.

*Delphinus microps*, Gray, l. c., p. 126. Zool. E. T., pl. 25.

Two crania, resembling closely Gray's figure quoted, differ from the preceding as given in the table, and in the shorter basal premaxillary triangle. The premaxillary ridge is strong, rounded, and the surface not at all continuous with that of the maxillaries. Proportions as follows:

	537	594
Length from notch to occipital condyle.....	6 in.	5.75 in.
“ “ “ middle of supraoccipital crest...	4.3 in.	4.5 “
“ “ “ end of muzzle.....	10 $\frac{1}{8}$ “	10.75 “
Width of muzzle at notch.....	3 “	3 “
“ “ middle.....	1.75 “	1 $\frac{7}{8}$ “
“ between outlines of frontal expansion.....	6 “	6 “
“ of temporal crests.....	5 “	4.5 “
“ across blow-holes.....	1 $\frac{3}{8}$ “	1.5 “
Length of gonys.....	2 $\frac{3}{8}$ “	2 “
Teeth.....	4 $\frac{1}{9}$	5 $\frac{1}{1}$

*Delphinus* an sp. nov. f vel *delphis*, varietas.

A single skull, from the Morton collection, stated to have been brought from the Indian Ocean; is very near those of the *delphis*, but has smaller nasal meatus and heavier proportions than our specimens of the latter, it resembles rather the cranium of the *D. fulvittatus*, Lesson, figured in *Voy. d. l'Astrolabe et Zélé*, in the nearly equal width of the muzzle; but the temporal fossa is elongate in the direction of the axis of the skull, as in most species, and not vertical to it. The *D. brevimanus*, Lesson, l. c., differs in the much more prominent occiput and the smaller number of teeth. The cranium of *D. novæzelandiæ* is not described. In *D. saô* the palatal grooves are much shorter. General proportions as follows:

Length from notch to occipital crest.....	5 in.	3 l.
“ “ “ end of muzzle.....	10 “	9 l.
“ of gonys.....	1 “	10 l.

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Breadth between temporal crests.....	5 in. 3 l.
“ “ frontal borders.....	6 “ .9 l.
“ of nasal meatus.....	1 “ 10 l.
“ of muzzle at notch.....	3 “ 7 l.
“ “ middle.....	2 “
Teeth.....	48

*Delphinus delphis.*

In four specimens (two from Mus. Salem,) the teeth vary within the above tabulated range, and have the length of muzzle from notch three times the breadth at latter point. The intermaxillaries form an elevated ridge. One specimen probably from the British seas.

*Stenofrontatus Gray ex Cuvier.*

A fine specimen from Mus. Salem (No. 102,) differs from the figure in Ossements Fossiles in that the contraction of the muzzle takes place behind the middle of its length, instead of in front of it, and the prominence of the nasal bones marks nearly the middle of the orbit instead of falling a short distance behind the postorbital process. Dimensions as follows:

	In.	Lines.
From end of symphysis mandibuli to convexity of occip. condyle...	21	
Length of symphysis.....	5	3
“ of ramus.....	16	6
End of muzzle to palatal notch.....	13	10
“ “ to preorbital notch.....	12	
Width at “ “ .....	4	3
“ of palate at first tooth.....	3	3
“ “ ninth tooth.....	1	8
“ between temporal crests.....	5	8
“ of nasal meatus.....	2	3
“ at postorbital processes.....	8	5
Teeth incurved, fang compressed.....		24

*Habitat.*—Unknown.

*Platanista gangetica.*

Mus. Academy. Morton Coll.

On the Species of *GALEBUCA* and allied Genera inhabiting North America.

BY JOHN L. LE CONTE, M. D.

Some of the species mentioned in the present paper are of interest in an economical view, being quite injurious to cultivated plants. Others will probably be found more or less injurious, as the advance of civilization in the western territories will from time to time enable them to substitute for their indigenous food plants useful to man.

Confusion exists in regard to the nomenclature of our species, not only because some of the most abundant have remained undescribed, but also for the reason that those already known have not been properly referred to the genera recognised in other parts of the globe; nor have definitions of the genera yet been given in any American work.

With a view of supplying the information thus needed, and enabling those interested in economic entomology to work with more effect by having the objects distinctly defined by characters and names, I have here endeavored to give in a brief synoptic form the distinctive marks of the *Galerucæ* and allied genera contained in my collection.

The tribe *Galerucini* (*Galerucidæ* of authors) consists of those *CHRYSO-MELIDÆ* having the antennæ inserted upon the front, generally closely approximate, long and slender; the anterior coxæ prominent and conical, generally

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contiguous, (separated by a very narrow prosternal prolongation only in *Malacosoma*;) the margin of the body not foliaceous, and the last joint of the tarsi extending beyond the lobes of the third joint. Laocordaire (Mon. Col., subpent. i., li.) states that the ungues are always appendiculate, but in several of the genera they are cleft, and in the new genus *Monoxia* they are quite simple and acute.

The group of genera which will now occupy our attention is distinguished by the hind thighs not being thickened. They do not therefore possess the power of leaping which is observed in *Haltica* and its allies.

I have not recognized the following species:

*Galeruca dorsata* Say, Journ. Acad. Nat. Sci., iii. 456; ed. Lec., ii. 221.  
*Galeruca puncticollis* Say, *ibid.*, iii. 458; ed. Lec., ii. 222. Perhaps a species of *Monoxia*.

*Galeruca furcata* Oliv., vide *Cerotoma*.

*Galeruca atomaria* Fabr., Syst. El., i. 490. Carolina; probably a species of *Monoxia*.

*Galeruca salicis* Randall, Bost. Journ. Nat. Hist., ii. 31. Maine, on willow; probably a species of *Monoxia*.

*Galeruca femoralis* Mels., Proc. Acad. Nat. Sci. Phila., iii. 161. Appears to be a specimen of the European *G. coprea*, and has, like several others in the Melsheimer collection, been erroneously regarded as native.

The genera represented in our fauna may be thus tabulated:

- I. Claws with a broad basal dilatation:  
 Antennæ with the 1st joint very long, and the third longer than the 4th..... *Cerotoma*.  
 Antennæ with the 1st joint moderate:  
 Front coxæ separated by prosternum..... *Malacosoma*.  
 Front coxæ contiguous:  
 Elytra not margined at the sides..... *Phyllobrotica*.  
 Elytra distinctly margined:  
 Epipleuræ not extending to the tip:  
 Last joint of maxillary palpi small, subulate..... *Phyllecthris*.  
 Last joint of maxillary palpi conical, acute..... *Luperus*.  
 Epipleuræ extending to the tip:  
 Upper margin of epipleuræ thick, obtuse..... *Agelastica*.  
 Upper margin of epipleuræ very sharp, prominent *Gastrogyna*, n.g.
- II. Claws cleft or acutely toothed:  
 Tibiæ with a deep groove on the outer side..... *Cœlomera*.  
 Tibiæ not sulcate externally:  
 Front carinated between the antennæ..... *Diabrotica*.  
 Front flat, with a median impressed line:  
 Epipleuræ extending to the tip..... *Galeruca*.  
 Epipleuræ not extending to the tip..... *Trirhabda*, n.g.
- III. Claws acute, usually entire..... *Monoxia*, n.g.

**CEROTOMA Chevr.**

The greater length of the first joint of the antennæ easily distinguishes this from the other genera. The body is rather robust and convex, glabrous above, with the thorax not impressed, and the epipleuræ well defined, extending nearly to the tip of the elytra, which are finely punctured. Eriehson (Wieg. Arch. 1847) describes the ungues as bifid; they are, however, appendiculate in our species.

1. *C. camina* Dej., Cat. 403. *Crioceris camina* Fabr., Syst. El., i. 459. *Galeruca cam.* Oliv., Ent. vi. 656, (No. 93, 72,) pl. 5, f. 73.

Southern, Middle and Western States; varies with the elytra destitute of the usual marking, the suture and scutellar region alone being dusky.

1865.]

2. *C. furcata* Dej., Cat. 403. *Galeruca furc.* Oliv., Ent. vi. 643, (No. 93, 48,) pl. 3, f. 50.

Unknown to me. Olivier mentions the locality as doubtful, and describes the thorax as having a transverse impression. I think that the reference to the present genus is therefore incorrect, and that Dejean probably had in view a variety of *C. caminea*, in which all the spots except the apical one were confluent.

#### MALACOSOMA Rosenhauer.

Easily distinguished from the other genera by the prosternum being prolonged between the front coxæ, which are thus separated by a narrow interval. The first joint of the antennæ is moderate, the 2d one-half as long as the 3d, which is equal to the 4th. The body is elongated, convex, glabrous, and nearly smooth above; the epipleuræ are well defined, and extend the length of the elytra.

1. *M. fuscula*, fusca, vel fusco-testacea, subnitida, thorace convexo, quadrato, ad basin rotundato medio submarginato, angulis posticis parvis prominulis, disco alutaceo, parce subtiliter punctulato, elytris fere obsolete punctulatis. Long. 12—15.

Pennsylvania, Illinois and Kansas. The head is marked between the eyes with two curved deeply-impressed lines, which limit small tubercles; in front of them, and between the antennæ is a short elevated ridge; the space before the antennæ is uneven, but scarcely punctured. Antennæ half as long as the body. Palpi darker at the tip. Thorax quadrate, scarcely wider than its length, sides converging slightly in front, apex truncate, anterior angles rounded, base broadly rounded, slightly emarginate at the middle, hind angles small, laterally prominent; disc convex, transversely impressed near the base, finely shagreened with very small scattered punctures. Elytra wider than the thorax, and about four times as long, sides parallel; transversely convex, vaguely impressed near the base, surface not very shining, feebly and almost obsolete punctulate, without brilliant reflexions. Beneath colored as above. In the male the 5th ventral segment is excavated, and furnished with a large, flat appendage, which is broadly and obtusely truncate at tip, and projects over the 6th segment. In two specimens (males) from Illinois the thorax is vaguely channelled.

2. *M. tineta*, testacea, nitida, elytris punctulatis, viridi-cyaneo suffusa, sutura margineque anguste testaceis. Long. 12—15.

Two specimens from Quincy, Illinois, given me by Mr. Willcox. This species is of the same form and size as the preceding, but differs by the elytra being distinctly but finely punctured, with a beautiful bluish-green gloss, which fades insensibly into testaceous at the suture and margin.

The 5th ventral segment of the male is deeply emarginate, and the process is narrow and acute, instead of broad and truncate, as in *M. fuscula*.

#### PHYLLOBROTICA Redtenbacher.

Among the genera with the claws dilated at the base into a broad tooth, this will be easily known by the side margin of the elytra being entirely wanting; the epipleuræ are consequently not defined. The body is elongate, glabrous and nearly smooth above, the thorax quadrate, truncate in front. The antennæ are moderately long, with the 2d joint about half as long as the 3d, which is equal to the 4th. The maxillary palpi are stout, with the last joint conical, as long as the preceding.

1. *P. decorata* Lec., Say's Ent. writings, ii. 203. *Galleruca dec.* Say, Journ. Acad. Nat. Sci. Phila., iii. 459; ed. Lec. l. cit. *Gall. Olivieri* Kirby, Fauna Bor. Am. iv. 218.

Canada, Lake Superior, Illinois; rare. In the male, the 5th ventral segment is very large, canaliculate, deeply excavated behind, with a small testa-

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ceous triangular appendage projecting over the 6th segment. The disc of the thorax is not impressed. The reference by Kirby of *Haltica 4-maculata* Oliv., Ent. vi. 673; pl. 1, f. 6, to this species, is more than doubtful.

2. *P. discoides* Dej., Cat. 405. *Galleruca disc.* Fabr., Syst. El., ii. 485. *Gall. circumdata* Say, Journ. Acad. Nat. Sci. Phila., iii. 457; ed. Lec. ii. 221. Var. *G. limbata*, Fabr., Syst., El. ii. 486.

Throughout the Atlantic States and Canada. Both Fabricius and Say describe the antennæ as black; the basal joints are quite frequently yellow, and I have specimens in which the antennæ are yellow and slightly fuscous towards the tip. The color also varies, the head and thorax in one specimen being black, and the under surface dark testaceous varied with piceous, the thighs blackish, the tibia and base of tarsi testaceous. The thorax has a broad transverse discoidal impression, which is sometimes disposed to divide into two.

In the male, the 5th ventral segment is very large, very deeply excavated, with a small elevated ridge in front of the excavation; the 6th is deeply excavated; the smaller males from Canada also have the antennæ quite sensibly thickened externally.

A singularly-colored specimen, collected in Kentucky, was given me by Mr. J. Ph. Wild. The head is black, with the front and mouth pale yellow. The thorax is bright yellow, the elytra black, with the sutural, lateral and apical margin yellow, and a small humeral vitta extending one-fourth the length of the elytra; the abdomen is black both above and beneath, ventral segments margined with piceous, the tip yellow; the feet are bright yellow, with the tarsi black.

3. *Ph. viridipennis*. *Diabrotica virid.* Lec., Proc. Acad. Nat. Sci. Phila., 1859, 81.

Fort Tejon, Cal.; Mr. Xantus. A beautiful species, having the thorax strongly impressed. The 5th ventral segment of the male is excavated for its almost entire surface, and is neither channelled nor carinated.

4. *Ph. lupulina*, nigra, thorace lævi quadrato, utrinque vage impresso, elytris cyaneis, parce subtiliter punctatis, antennis testaceis extrorsum infuscatis, pedibus flavis, femoribus picee maculatis. Long. .26.

One specimen, collected at San Mateo, Cal., given me by Mr. A. Agassiz. The discoidal impression of the thorax is vague, and scarcely extends to the middle, so that it appears to be divided into two. This insect closely resembles in appearance a *Luperus*.

#### PHYLLECHTHRUS {Dej.

Body elongate, glabrous and nearly smooth above. Head transversely impressed between the eyes, and with a short median impressed line; acutely carinate between the antennæ, which are very long; 2d and 3d joints together shorter than the 4th, nearly equal in size in the female, 2d connate with the 3d, and nearly obsolete in the male. Maxillary palpi stout, the last joint shorter than the preceding, slender, subulate, acute at tip. Prothorax quadrate, truncate at the apex, with a lunate dorsal impression more or less distinct. Elytra with the lateral margin distinct, epipleuræ very narrow, not extending to the tip. Anterior coxæ conical, contiguous; legs slender, tibiæ not sulcate externally, middle tibiæ of the male incised at the extremity on the inner margin; unguis with a large angular basal dilatation. Abdomen with five ventral segments nearly equal in length and alike in both sexes.

I have adopted the generic name proposed in Dejean's Catalogue for *Gall. dorsalis* Oliv.

1. *Ph. atriventris*. *Gall. atriventris* Say, Journ. Acad. Nat. Sci. Phila., iii. 461; (ed. Lec., ii. 224.)  
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I found this species quite abundant near the Arkansas River, below Bent's Fort. Say states that it lives on *Amorpha fruticosa*. It differs from the next by the head and thorax being entirely yellow, with the impression of the latter tolerably deep, as in *Phyllobrotica decorata*.

2. *Ph. dorsalis* Dej., Cat. 406. *Galleruca dors.* Oliv., Ent. vi. 646, (No. 93, 52,) pl. 4, f. 54.

Two specimens from Kansas; is also found in the Southern States. Of the same size, form and sculpture as the preceding, but the discoidal impression of the thorax is very faint, and it is marked with two black vittæ, which sometimes unite along the anterior margin, thus causing the anterior part of the thorax to become blackish; the tibiæ and tarsi are entirely black.

3. *Ph. gentilis*, *elongatus*, *nitidus flavo-testaceus*, *supra laevis*, thorace quadrato, dorso vage transversim impresso, vittis duabus latis nigris ornato, elytris nigris, sutura margine laterali apicalique anguste flavis: antennis fasciis, articulis 4 et 5 testaceis. Long. 15.

Three specimens; Georgia. A very pretty little species, easily distinguished by the characters given above. The discoidal impression of the thorax is faint; the under surface of the body is yellow, with the last ventral segment of the abdomen fuscous. The legs are entirely yellow. The sexual characters are as in the two preceding species.

#### LUPERUS Geoffr.

The species of this genus as now restricted will be readily recognised by the elongate form, the quadrate thorax, without discoidal impression, and the epipleuræ moderately wide at base, not extending to the tip of the elytra. The body is glabrous, shining and nearly smooth above. The antennæ are 11-jointed in both sexes; the 2d joint is shorter than the 3d, but the latter is not equal to the 4th. The maxillary palpi are rather slender, with the last joint as long as the preceding, gradually narrowed to the tip, which is rounded. The thorax is truncate at the apex, slightly rounded on the sides, nearly truncate at base, with the hind angles acute and laterally prominent. The front coxæ are conical and contiguous; the legs are slender, the tibiæ not sulcate externally, and the ungues have a broad acute basal dilatation.

In the males the antennæ are a little longer than in the females, and the 5th ventral segment is broadly impressed and truncate at the tip.

Our species may be distinguished as follows:—

##### A. Prothorax yellow:

Yellow, elytra black, pectus and abdomen fuscous..... 1. *thoracicus*.

Yellow, occiput, base of elytra and transverse spot behind

the middle fuscous, pectus black..... 2. *fibulatus*.

Yellow, elytra with suture and submarginal vitta black. 3. *bivittatus*.

Blue shining, prothorax yellow, post pectus black..... 4. *flavicollis*.

##### B. Body uniform in color.

\*Hind angles of prothorax not prominent, but acute:

Prothorax sparsely punctulate, hind angles not prominent:

Legs entirely black..... 5. *samaragdulus*.

Legs varied with testaceous ..... 6. *varipes*.

Prothorax convex nearly smooth:

Legs varied with yellow..... 7. *cyanellus*.

\*\*Hind angles of thorax acute, dentiform.

Thorax wider than long:

Elytra smooth, legs yellow..... 8. *rufipes*.

Elytra punctulate, thighs varied with black..... 9. *meraca*.

Thorax longer than wide, legs black..... 10. *lengulus*.

\*\*\*Hind angles of thorax obtuse:

Body entirely black, elytra punctulate..... 11. *morulus*.

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base; the elytra are scarcely punctulate; the antennæ and feet are entirely black.

11. *L. morulus*, elongatus, niger nitidus, thorace latitudine paulo brevior, quadrato, angulis omnibus subrectis haud prominulis, disco obsolete parce punctulato, utrinque versus latera leviter impresso, elytris thorace latioribus, parce fere obsolete punctulatis; antennarum articulo 3io 2ndo vix longiore, conjunctis 4to æqualibus. Long. .4.

Texas; I owe three specimens to the liberality of Mr. Ulke. This species differs from all the preceding by the third joint of the antennæ being scarcely longer than the second, and both united are not longer than the fourth. I infer from European works that it represents the genus *Calomicrus Stephens*, of which Redtenbacher observes, that he finds no difference between it and *Luperus*, except the equality of the second and third joints of the antennæ in the former.

In the three specimens before me, the ventral segments 1—4 are nearly equal in length, and the fifth is much longer, marked with two distant deeply impressed lines extending from the hind margin nearly to the base of the segment. The antennæ are more than two-thirds the length of the body, and I consider them all as males.

#### AGELASTICA Redt.

The body in this genus is ovate and convex, resembling in form *Oedionychis* among the allies of *Haltica*. The head is deeply channelled between the eyes, and the usual transverse sinuated line is faint; the front between the antennæ is scarcely elevated. The antennæ are rather long and stout, with the second joint half as long as the first, the third is a little longer than the second, and both together are longer than the fourth. The maxillary palpi are very stout, the last joint is shorter than the preceding, conical, scarcely longer than its width at base. Prothorax transverse, broadly emarginate in front, and rounded at base, with the angles not prominent. The disc is marked each side with a deep excavation. Elytra convex, dilated behind, obtusely rounded at tip, marked with two foveæ at base; epipleura distinctly defined, extending to the tip; lateral margin thick and obtuse toward the tip. Anterior coxæ conical, prominent, contiguous; tibiæ not sulcate externally, unguis with a broad angular basal dilatation.

The characters of this genus are not very well defined, but its more robust form and stronger sculpture will enable it to be readily distinguished.

1. *A. halesis*, rufo-testacea, occipite cyaneo, thorace transverso nitido, utrinque profunde excavato, elytris læte cyaneis, fortiter licet subtiliter punctatis, antennis nigris, pedibus rufis, tibiis apice tarsisque nigro-piceis. Long. .20 — .28.

Redt. Faun. Austr. 2d ed. 930. *Chrysomela hal.* Linn. *G. nigricornis* Panz., &c.

Two specimens of this common European species were given me as collected at Farmington, Connecticut, by Mr. Edward Norton.

#### GASTROGYNA Lec.

Body different in form in the two sexes, above glabrous, nearly smooth. Head with a short medial impressed line between the eyes; front before the antennæ transversely broadly impressed, labrum large, not emarginate. Maxillary palpi slender, last joint longer than the preceding, pointed at tip. Antennæ long and rather stout, second joint one-third as long as the first, third somewhat shorter than the fourth; eyes small, rounded, not very prominent. Prothorax transverse, truncate in front and behind, sides nearly straight, front angles prominent, but rounded at tip, hind angles not prominent, slightly obtuse. Elytra elongate and parallel in the male, wider

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than the thorax, flat and broadly separately rounded at the tip in the female; punctured in both sexes, with the lateral margin acute, and the epipleuræ well defined, extending nearly to the tip. Anterior coxæ prominent, conical, contiguous; tibiæ not sulcate externally, tarsi with the last joint as long as the first, ungues with a large obtusely rounded basal dilatation.

In the male, the antennæ are as long as the elytra, which extend a little beyond the abdomen; wings perfect.

In the female, the antennæ extend to the tips of the elytra, but the abdomen is enormously inflated, and more than twice the length of the elytra; wings wanting.

1. *G. insolita*. *Diabrotica? insolita* Lec., Proc. Acad. Nat. So., Phil., 1861, 338.

Cape San Lucas, Lower California; Mr. Xantus. The head, thorax and elytra are muddy yellow; the elytra distinctly punctured, with a humeral spot, and another behind the middle black; the scutellum, tibiæ, tarsi, palpi and antennæ are black, the thighs testaceous, the postpectus and abdomen blackish piceous.

#### CCELOMERA Chevr.

Erichson (Wieg. Arch., 1847) desires to restrict this genus to those species in which the antennal joints 5-10 are much shorter than the 4th. A more valuable character appears to me to be the deep groove on the outer face of the tibiæ, which distinguishes this from all the other genera represented in our fauna. The maxillary palpi are rather stout, with the last joint as long as the preceding, but narrower, subconical, and rounded at the tip. The claws are cleft, with the inner part shorter, but as broad as the outer, and acute at tip. The epipleuræ are very narrow, and do not extend to the tip. The body above is glabrous and nearly smooth.

1. *C. coryli*. *Galleruca cor.* Say, Journ. Acad. Nat. So. Phil., 3, 455; ed. Lec. ii. 220.

Middle, Western States, and Kansas. Mentioned by Say as feeding on hazel bushes. I have never collected this species, but have received it from several friends. It is easily known by its large size, pale color, with broad basal and subapical bands of a bluish black color on the elytra. The elytra of the male are parallel at the sides, those of the female are considerably dilated from the base for two-thirds the length, then obtusely rounded. In the only male before me, the elytra are longer than the abdomen, and the extremity is longitudinally compressed and elevated; this is probably an individual deformity. The last ventral segment is deeply cleft in the male, but less so in the female.

Specimens occur with the dark bands badly defined, and sometimes entirely wanting.

#### DIABROTICA Chevr. -

This genus contains small species, with elongate body, glabrous above, and generally nearly smooth, though sometimes with deep elytral striae. The head is marked with a deep transverse impression, or a large fovea, between the eyes, and the front is strongly carinated. The maxillary palpi are not very stout, the last joint is conical, acute, and somewhat shorter than the preceding (but scarcely subulate, as described by Erichson, Wieg. Arch., 1847). The antennæ are moderately long, the third joint is sometimes equal to the second, sometimes longer, but both united are not longer than the fourth. The thorax is sometimes even, sometimes deeply impressed each side of the middle. The elytra are sometimes elongate and parallel, sometimes convex and ovate; the epipleuræ are well defined, but do not extend to the tip. The legs are slender, the tibiæ not sulcate externally, the claws cleft, the inner part nearly equal to the upper one.

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Our species can be arranged in four natural groups, of which the fourth seems to be equivalent to the European genus *Rhapidopalpus* Rosenh.

- A. Thorax without distinct impression, third joint of antennæ longer than the second. (Group 1.)
- Elytra yellow, with three broad bands and apex black..... 1. *tricincta*.
- Elytra with two transverse bands, and two posterior spots on each, brown..... 2. *connexa*.
- B. The third joint of antennæ equal to the second:
- a. Elytra not striate; thorax with two faint impressions. (Group 2.)
- Elytra with twelve large black spots..... 3. *12-punctata*.
- Abdomen and base of thighs yellow..... 4. *scoror*.
- Abdomen and legs entirely black..... 5. *tenella*.
- Elytra with twelve small black spots..... 6. *baiteata*.
- Elytra with transverse pale green bands.....
- b. Thorax with two very deep impressions:
- \*Elytra deeply striate. (Group 3.)
- Elytra pale, with suture and submarginal vitta black:
- Knees and tarsi black..... 7. *vittata*.
- Legs black, femora pale at the base..... 8. *trivittata*.
- \*\*Elytra carinate towards the sides. (Group 4.)
- Greenish yellow, elytra strongly punctured and subsulcate..... 9. *longicornis*.
- Black, elytra sparsely punctulate, prothorax yellow or black..... 10. *atripennis*.

1. *D. tricincta* Lec., Say's Ent. ii. 222. *Galleruca tric.* Say, Journ. Acad. Nat. Sc. Phil. iii. 457; ed. Lec. ii. 221.

Abundant along the Arkansas river, near the mountains: a specimen was sent me from Arizona, by Dr. B. J. D. Irwin, U. S. A.

2. *D. connexa*, rufo-flava, nitida, capite fusco, elytris postice latioribus, convexis, basi, fascia transversa ad medium, guttisque utrinque posticis duabus rufo-fuscis, fascia basali et mediali vitta angusta convexis; postpectore tibiis tarsisque obscuris, antennis fuscis basi pallidis. Long. .28.

One specimen from Rio Grande, Texas. Of the same size and form as *D. 12-punctata*, but differing by the elongated third antennal joint, and by the elytral markings, which are thus arranged; a basal band extending from the suture to the reflexed margin, another at the middle slightly oblique, connected with the first by a short longitudinal stripe near the side; two rounded spots behind the middle, placed transversely, the outer one being smaller and a little posterior. The thorax is quadrate, a little longer than its width, smooth, and without impressions. The antennæ are fuscous, with the first three joints pale; the second is only one-third the length of the third, which is as long as the 4th. The thighs are yellow, the tibiæ and tarsi fuscous; the postpectus piceous. The scutellum is of the color of the elytral bands.

3. *D. 12-punctata* Dej., Cat. 405; Mannh. Bull. Mosc., 1843, 309. *Chrysomela*, *Galleruca* et *Criocaris 12-punct.* Fabr.; *Galleruca 12-punct.* Oliv. Ent. vi. 628 (No. 93, 23), pl. 2, f. 31.

Abundant throughout the Atlantic district from Canada to Mexico; varieties sometimes occur, having the spots more or less confluent longitudinally. The first three joints of the antennæ are yellow, the abdomen and base of the thighs are also yellow.

4. *D. scoror*. *Diabrotica 12-punctata*, var., Mannh. Bull. Mosc., 1843, 309.

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California, Oregon, and Arizona. This species represents the preceding in the Pacific district, and only differs from it by the under surface, the legs and the antennæ being black. I have observed no transition between the two forms, and since in this, as in other genera of Chrysomelidæ, the distribution of color is an important specific character, I am obliged to admit it as a distinct species.

5. *D. tenella* Lec., Proc. Acad. Nat. Sc. Phil., 1850, 88.

Fort Yuma, Colorado River, California. Colored like *D. 12-punctata*, but the elytral spots are very small.

6. *D. balteata*, elongata, pallida, nitida, thorace bümpresso, elytris subtilius punctatis, fasciis tribus pallide viridibus ornatis, antica versus basin vitta emittente; occipite antennisque rufo-fuscis, his articularis tribus baseos pallidis; postpectore, tibiis tarsisque fuscis. Long. .23.

One specimen from the Rio Grande, Texas. A very beautiful and delicately-tinted species; the second transverse band of the elytra is a little behind the middle, and is limited each side by oblique impressions.

7. *D. vittata* Dej., Cat. 405. *Crioceris vitt.* Fabr., Ent. Syst. i. 2, 12; El. i. 455; *Galleruca vitt.* Oliv., Ent. vi. 633; Enc. Méth. vi. 590; Harris Ins. Inj. Veg. 2d ed., 124; Shimer, Prairie Farmer, xvi. 109.

Abundant in the Atlantic States; quite destructive to cucumber vines and other cultivated Cucurbitaceæ. The two thoracic impressions become confluent at the middle; the elytral striæ are very deep; the legs are yellow, with the knees, the tips of the tibiæ and the tarsi black.

8. *D. trivittata* Mannh., Bull. Mosc., 1843, 309.

California. Closely resembles the preceding, but the impressions of the thorax are smaller and not confluent; the striæ of the elytra are less deep, and less strongly punctured; the feet are black, with the base of the thighs pale; the antennæ are entirely black.

9. *D. longicornis* *Galleruca long.* Say, Journ. Acad. Nat. Sc. Phil., iii. 460; ed. Lec. ii. 223.

Illinois and Kansas; differs from the next species by the elytra being densely punctured, with traces of faint striæ.

10. *D. atripennis* *Galleruca atr.* Say, Journ. Acad. Nat. Sc. Phil., iii. 461; ed. Lec. ii. 224. Prothorax and abdomen yellow.

Var. a. Body black, prothorax yellow, with a broad dorsal black vitta. *Galleruca (Adimonia) cristata* Harris, Hartford Tr. Nat. Hist. Soc. 90.

Var. b. Body entirely black. *D. ? fossata* Lec., Pr. Ac. Nat. Sc. Phil., 1858, 88.

The type occurs in Kansas; var. a. throughout the Atlantic States, and var. b. in Texas, Illinois, and at Lake Superior. After careful examination, I can find no differences but those of color.

#### GALLERUCA Geoffr.

This genus, by an error of spelling, is usually known as *Galleruca*, and is restricted to species which are punctured, and more or less pubescent above. The front is not carinated between the antennæ; the maxillary palpi are rather stout, with the last joint conical; the third joint of the antennæ is equal to the fourth and longer than the second. The epipleuræ extend to the tip of the elytra, except in *G. xanthomelæna*, where the lower margin becomes obsolete behind, without uniting with the upper margin, and in *G. infusata* and *morosa*, where the upper margin is obtuse, and becomes obsolete near the tip. The front coxæ are contiguous, conical and prominent; the tibiæ are not sulcate, the claws are acutely toothed, or may be regarded as cleft, with the lower part much shorter than the upper.

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Our species are numerous, and may be grouped as follows, in a tolerably natural manner, though intermediate forms occur. The relation between the groups and the sexual characters does not appear to be as precise in our species as it was found by Suffrian in those of Europe. (Vide Stettin Ent. Zeit., 1843, p. 91.)

- A. Extreme margin of elytra acute ;  
 a. Body above coarsely punctured, glabrous or slightly pubescent :  
 \*Marginal sulcus not distinct from the margin. (Group 1.)  
 Black, elytra costate, margined with yellow.....1. *externa*.  
 Testaceous, elytra usually with black vittæ :  
 Elytra cribrate-punctate, thorax shining.....2. *cribrata*.  
 Elytra cribrate-punctate, thorax opaque.....3. *americana*.  
 Elytra densely coarsely punctured, thorax opaque 4. *conferta*.  
 Elytra densely less coarsely punctured, thorax opaque.....5. *sexvittata*.  
 \*\*Marginal sulcus distant from the margin, which is thickened, (color uniform dark red.) (Group 2.)  
 Body ovate, convex ; elytra cribrate-punctate :  
 Thorax shining, deeply excavated.....6. *cavicornis*.  
 Thorax opaque, deeply excavated.....7. *rufosanguinea*.  
 Body elongate, elytra densely punctured.....8. *hæmatica*.  
 b. Body above not very coarsely punctured, sericeous pubescent ; never ovate convex : (Group 3.)  
 Base of thorax sinuate each side near the angles.....9. *tuberculata*.  
 Base of thorax obliquely truncate each side :  
 Thorax shining, with two deep excavations ; sutural angle of elytra prominent, side margin yellow :  
 Elongate, elytra rather finely punctured.....10. *punctipennis*.  
 Elytra less finely punctured :  
 Elongate, angles of thorax scarcely prominent.....11. *marginella*.  
 Less elongated, angles of thorax prominent.....12. *sagittaria*.  
 Thorax opaque, bifoveate ; sutural angle not prominent :  
 Elytra not densely punctured, color brown.....13. *decora*.  
 Elytra not densely punctured, color entirely black.....14. *carbo*.  
 Elytra testaceous, with four black lines on each :  
 1st and 2d vittæ confluent behind the middle 15. *notulata*.  
 2d vitta very short, basal.....16. *notata*.  
 2d and 4th vittæ entire.....17. *integra*.  
 c. Body above finely punctured, moderately pubescent, inferior margin of epipleuræ obsolete near the tip. (Group 5.).....18. *xanthomelæna*.  
 B. Lateral margin of elytra obtuse, but slightly prominent. (Group 6.)  
 Elytra with very short pubescence.....19. *maritima*.  
 Elytra with moderately long pubescence.....20. *morosa*.

Group I. ADIMONIA Leich.

In this group the body is usually stout, ovate and convex, with the elytra dilated behind, scarcely pubescent, and generally very coarsely punctured ; the thorax is short, narrowed in front, rounded on the sides, with the angles frequently not prominent or dentiform. The wings are perfect in all our species, though some European species are destitute of those organs.

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1. *G. externa* Say, Journ. Acad. Nat. Sci., Phila., iii. 458; ed. Lec., ii. 222. *Adimonia ext.* Lec., *ibid.*; *G. rudis* Lec., Rep. Pacific R. R. Expl., 69.

Kansas and Oregon; those from the former locality are more coarsely punctured, but do not show any specific differences.

The fifth ventral segment in both sexes is marked with two large impressions, and in the male is emarginate at tip.

2. *G. cribrata*, ovata, convexa, sordide rufo-testacea nitida, thorace brevi antrosum angustato, lateribus rotundatis, angulis haud prominulis, basi utrinque oblique truncato, disco haud dense punctato, vage 3-foveato et ad angulos posticos oblique impresso, elytris fortiter cribratim punctatis, aspe vitis angustis tribus utrinque ornatis; margine laterali fortius reflexo: antennis extorsum infuscatia. Long .21—.28.

Massachusetts, Georgia, Pennsylvania, Illinois, Kansas. The black vittæ are very narrow, and extend from the base almost to the tip; the outer one is very frequently obsolete, and often all are completely wanting. Sexual characters as in *G. externa*, except that the impressions of the fifth ventral segment are transverse and smaller.

3. *G. americana* Fabr., Syst. El. i. 489; Oliv., Ent. vi. 636, (No. 93, 36,) pl. 3, f. 43.

Middle States, Illinois, Lake Superior. Of the same form as the preceding, but generally a little smaller, and the elytra are clothed with coarse pubescence. The punctation of the elytra is equally coarse, but the sides are not so strongly margined; the thorax is more punctured, the hind angles are not flattened by oblique impressions, and are somewhat prominent; the three discoidal impressions of the thorax are fuscous; the suture of the elytra and three narrow vittæ on each are blackish; the inner one is sometimes obsolete. Last ventral segment with a transverse impression each side; tip emarginated in the male.

4. *G. conferta*, elongato-ovata, minus convexa, sordide testacea haud nitida, thorace brevi antrosum angustato, angulis haud prominulis, lateribus rotundatis, basi utrinque oblique truncato, disco late canaliculato, vage biimpresso, fusco trimaculato, confertim subtilius punctato; elytris dense fortiter punctatis brevissime parce pubescentibus, fortius marginatis, vittis utrinque tribus nigris, intermedia postice abbreviata; antennis fuscis, articulis 3 primis testaceo-maculatis; abdomine fusco, cinereo pubescente. Long .21.

Canada and Illinois; two specimens. This species has the elongate form of *G. notulata*, but is more dilated posteriorly; the elytra are densely but coarsely punctured, the pubescence is very short, and not conspicuous. The last ventral segment is transversely impressed each side, as in the preceding species.

5. *G. sexvittata*, elongata, supra obscure testacea opaca, thorace brevi antrosum angustato, lateribus rotundatis, angulis haud prominulis, dense minus subtiliter punctato, subcanaliculato, utrinque late impresso, vitta dorsali maculaque utrinque nigris; elytris dense punctatis, (punctis antice fortioribus), vittis utrinque tribus nigris fere integris ornatis; vitta capitis, antennisque nigris, femoribus medio, tibiis apice tarsisque nigris. Long .24.

One male from Pennsylvania; the fifth ventral segment is transversely impressed each side, and slightly emarginate at tip. This species resembles *G. conferta*, but is more finely and densely punctured.

#### Group II. ADIMONIA p. Laich.

In two of the species of this group the body is ovate and convex, but in the third the form is elongate; the upper surface is coarsely punctured, and the pubescence very short and indistinct; the thorax is deeply channelled, and 1865.]

has a large excavation each side; the anterior angles are prominent, and the base each side is sinuate. The superior epipleural margin is acute, but not prominent, the margin of the elytra being thickened, and the marginal sulcus somewhat remote from the extreme margin. The last ventral segment in both sexes is transversely impressed each side, but in the male is deeply excavated and emarginate behind, the outline of the emargination being rounded and not angular. They are all of a dull red color.

6. *G. oavicolis*, obscure sanguineo-rufa, ovata convexa, thorace nitido, brevi, lateribus subangulatis, angulis omnibus prominulis, basi utrinque profunde oblique sinuato, disco cribratim punctato, profundo canaliculato, et utrinque late excavato, elytris parce brevissime pubescentibus sat dense cribratim punctatis; antennis nigris, tarsis fuscis. Long. .21.

One specimen from North Carolina, Dr. C. Zimmermann. This species must be very similar to the European *G. sanguinea*, but I have had no opportunity for comparison.

7. *G. rufosanguinea* Say, Journ. Acad. Nat. Sci., Phila., v. 299; ed. Lec., ii. 343; *Adimonia ruf.* Lec., ibid. 344.

Middle and Southern States. Of the same convex form as the preceding, but not at all shining.

8. *G. hamaticà*, sanguineo-rufa, elongato-ovata, minus convexa, thorace nitido, brevi, lateribus late rotundatis, angulis omnibus prominulis, basi utrinque oblique sinuato, disco cribratim punctato, profunde canaliculato, et utrinque valde excavato, elytris opacis, parce brevissimè pubescentibus, confertim fortiter punctatis, antennis nigris, pedibus nigris plus minusve rufis. Long. .20—.22.

Quebec, Canada, Mr. W. Couper; also found in Illinois, and at Fort Liard, Hudson Bay Territory. The last ventral segment of the male is deeply excavated, the excavation limited by a sharp edge, which is curved in front and not angulated.

#### GROUP III.

Oval or elongate species, less convex than most of those of the preceding groups, and clothed above with a fine sericeous pubescence; the punctures are never very coarse, the angles of the prothorax are frequently prominent, and the marginal sulcus of the elytra is broader than usual, causing the margin itself to appear thinner and more reflexed, except in *G. tuberculata*, where the sulcus is somewhat separated from the margin, and the latter is slightly thickened, though much less so than in Group II.

The species are found exclusively upon aquatic plants, and, with the exception of the small species allied to *G. decora*, are easily defined and recognized.

9. *G. tuberculata* Say, Journ. Acad. Nat. Sci., Phila., iii. 456; ed. Lec., ii. 220; *Adimonia tub.*, Lec., ibid.

Middle and Western States; distinguished by its larger size, and slightly thickened elytral margin; the sutural angle of the elytra is not prominent; the base of the thorax is obliquely sinuate near the sides.

The fifth ventral segment in the male is narrowly incised at tip, and canaliculate nearly to the base.

10. *G. punctipennis* Mannh., Bull. Mosc. 1843, 308.

California, two specimens kindly sent me by Col. Motschulsky. Of the same elongate form as the next species, with the front angles of the thorax scarcely prominent, and with the sutural angle of the elytra equally prominent; they are, however, more finely punctured, and the punctures become smaller towards the sides and tip.

The fifth ventral segment of the male is acutely emarginate.

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11. *G. marginella* Kirby, Faun. Bor. Am. iv. 220; ?*G. lactuosa* Mannh., Bull. Mosc. 1865, 368; *ibid.* 1853, 259.

I refer a specimen of narrow form, and .25 unc. long., from Fort Simpson, Hudson Bay Territory, to this species. It differs from the next by its more elongate form and scarcely prominent anterior angles of the thorax. The body beneath is black, clothed with silvery hairs, legs brown, tibiae and tarsi paler. This species should probably not be separated from *G. nymphæa* Fabr., Ent. Syst., i. 2, 21; Syst. El., i. 486. Oliv. Ent., vi. 643, (No. 93, 49,) pl. 3, fig. 51, &c., &c. *Chrysomela nymphæa* Linn.

12. *G. sagittariæ* Gyll., Ins., iii. 511, &c., &c. Redt., Fauna Austr., 2d ed., 928.

Found throughout the middle and northern parts of the Atlantic district. I refer to this species the rather stoutly-formed specimens with punctured elytra and well marked sutural angle, which occur abundantly on *Nymphæa* and *Nuphar*; the prothorax is polished, with scattered large punctures; the dorsal channel is well marked, and the two discoidal excavations large and deep; the sides are subangulated, and the anterior angles prominent; the base is obliquely truncate each side, as in the two preceding species; the disc is yellow, usually with three large blackish spots. The pubescence of the elytra is very short, and the margins yellow-testaceous. The under surface is dusky, the tip of the abdomen pale; the legs testaceous, with part of the thighs and outer portion of tibiae and tarsi dusky.

The last ventral segment of the male is deeply and acutely emarginate.

13. *G. decora*, longiuscula, fusca vel picea, dense sericeo-pubescent, thorace opaco, subtiliter dense punctato, canaliculato, utrinque late foveato, lateribus late rotundatis, angulis omnibus valde prominulis, basi utrinque oblique truncato, elytris haud dense punctatis, angulo suturali apice rotundato; subtus nigro-picea, pedibus obscure testaceis. Long. .19—21.

Say, Long's Exp. St. Peter's, ii. 294: ed. Lec. i. 195.

Abundant at Lake Superior, Slave Lake, and in Canada; found also in Mass. and Illinois.

This species varies considerably in color and sculpture; the lighter-colored specimens have the thorax yellow with three black spots, and the elytra margined with yellow; the thoracic angles are usually very prominent, but sometimes are less conspicuously so; the elytra are sometimes very strongly and uniformly punctured: sometimes the punctures towards the tip are less impressed. I have not been able to discover any constant differences sufficient to lead to a division of the species into races.

The fifth ventral segment of the male is deeply excavated, the margin of the excavation being acute and elevated, almost as in *G. hsmatica*.

14. *G. carbo* Lec., Proc. Ac. Nat. Sci. Phila., 1861, 358.

Oregon, east of Fort Corville, G. Gibbs, Esq. Only differs from the preceding by the color, which is entirely black. It should probably be considered as a race of *G. decora*.

15. *G. notulata* Fabr., Syst. El., i. 439; Oliv. Ent., vi. 636, (No. 93, 37,) pl. 3, fig. 44.

Found throughout the Atlantic district. Of the same form and sculpture as *G. decora*, but differing in color, which is dirty testaceous above, with an occipital line, three thoracic spots, and four narrow lines on each elytron black; the subsutural vitta extends from before the middle nearly to the tip, where it unites with the submarginal one; the second vitta is oblique, and becomes confluent with the subsutural one behind the middle.

I think that *G. bilineata* Kirby, Faun. Bor. Am., iv. 220, is a specimen of this species with indistinct markings.

The fifth ventral segment is impressed transversely each side in both sex, and is tolerably strongly emarginate at tip in the male.

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16. *G. notata* Fabr., Syst. El., i. 488. Oliv. Ent., vi. 637, (Nos. 93, 38,) pl. 3. fig. 45.

Also widely diffused in the Atlantic district. Of the same form and color as the preceding, but the first, third and fourth black stripes of the elytra reach neither the base nor the tip, and the second one is very short, extending from the base only about one-sixth the length. The elytra are rather more finely punctured.

The last ventral segment is transversely impressed each side, and in the male is acutely but not deeply emarginate at tip.

17. *G. integra*, elongata, minus convexa, supra subtiliter at dense pubescens, sordide testacea subopaca, thorace brevi, lateribus rotundatis, angulis haud prominulis, dense subtiliter punctato vix canaliculato, utrinque vage impresso, vitta dorsali punctoque utrinque discoidali nigris, elytris dense punctatis, punctis postice subtilioribus, vittis utrinque quatuor angustis nigris, quarum secunda et quarta integris, apice conjunctis; tarsis fuscis, antennis picis basi testaceo-maculatis. Long. .22.

Two specimens; Pennsylvania.

More elongated and less convex than the two preceding species, with the vittæ of the elytra differently arranged; the subautural one reaches neither the base nor the tip; the second and fourth commence at the base and unite near the tip; the third is a little abbreviated behind.

The fifth ventral segment of the male is deeply and acutely emarginate.

#### GROUP IV.

A European species, introduced upon this continent, represents this group in our fauna. The body is oval, very slightly convex, densely rather finely punctured and pubescent above. The lateral margin of the elytra is acute and the marginal sulcus, as in Group III., is not removed from the margin; the inferior margin of the epipleuræ becomes obsolete near the tip, without, however, uniting with the upper margin, as it does in those genera in which the epipleuræ do not extend to the tip.

18. *G. xanthomelæna* Duftschm. Redt., Fauna Austr., 2d ed., 927, &c., &c.

*G. californiensis* Fabr., Syst. El., ii. 488; Harris, Ins. Inj. Veg., 2d ed., 124; Fitch, Fifth Report on Noxious Insects of New York, No. 346.

*G. gelatinariæ* Fabr., Syst. El. i. 490; Oliv. Ent., vi. 32, (No. 93, 30,) pl. 3, fig. 37; (a dark colored variety.)

Maryland and Pennsylvania. Injurious to elm trees by the larvæ eating the young leaves. The fifth ventral segment of the male is deeply and acutely emarginate.

#### GROUP V.

Two elongate slightly convex species, found near the shores of the ocean, constitute this group. They are densely punctured above and moderately pubescent: the thorax is rounded on the sides, with the angles not at all prominent; the lateral margin of the elytra is obtuse, and but slightly prominent, becoming obsolete near the tip, and scarcely uniting with the inferior margin of the epipleuræ. The marginal sulcus is very narrow.

19. *G. maritima*, elongata, testacea, fusca, vel nigra, capite rude punctato, thorace brevi antrosum angustato, lateribus late rotundatis, angulis haud prominulis, basi utrinque oblique subtruncato, disco parum convexo, fortiter punctato, breviter canaliculato, utrinque vage foveato, angulis posticis obtusis explanatis, elytris dense subtilius punctatis, pube brevi pallida minus dense vestitis. Long. .30.

Abundant along the the sea coast from New York to Florida. Intermediate

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variations occur in which the thorax is partly testaceous, and the elytra black, with the margin and suture pale.

20. *G. morosa* Lec., Rep. Pacific R. R. Expl., 70.

One specimen found on salt marsh at San Francisco, Cal. Resembles a black individual of *G. maritima*, but the thorax is less narrowed in front, less rounded on the sides, and the hind angles are not flattened; the elytra are more coarsely punctured, and the pubescence is longer and nearly white.

TRIRHABDA Lec.

Body elongate, not very convex, finely punctured and pubescent. Front flat, with the usual impressions as in *Galeruca*; not at all carinate between the antennæ; maxillary palpi not very stout, with the last joint conical, acute, as long as the preceding, and not smaller than it at the base; antennæ with the third joint intermediate in size between the second and fourth. Prothorax with a large, transverse, broad impression, which is disposed to divide into three, being deeper at the middle and at the sides. Elytra distinctly margined at the sides, with the epipleuræ very narrow, and becoming indistinct about the middle. Anterior coxæ conical, prominent, contiguous; tibiæ not sulcate externally; unguis cleft at the tip, with the inner part a little shorter than the outer. The last ventral segment in the males is slightly emarginate.

These species are of large size: the head and thorax are pale, the former with an occipital, the latter with three discoidal black spots; the elytra are pale, with a broad sutural and discoidal black (or rarely green) stripes. In some species these vittæ coalesce, causing the margin only to remain pale.

The differences in the proportion of the joints of the antennæ and in the epipleuræ prevent these species from being retained in *Galeruca*. The genus does not appear to be represented in Europe.

The species may be distinguished as follows:

- Thorax smooth, polished, feebly impressed.....1. *nitidicollis*.
- Thorax more or less punctured;
- Lateral and apical margins of elytra yellow;
- Elytra extremely finely punctured;
- Vittæ black, generally uniting near the tip .....2. *canadensis*.
- Vittæ green or bronzed, entirely confluent.....3. *luteocincta*.
- Elytra moderately finely punctured;
- Vittæ blue, entirely confluent.....4. *flavolimbata*.
- Vittæ blue, gradually approaching behind;
- Larger, elytra more finely punctured.....5. *attenuata*.
- Smaller, elytra less finely punctured.....6. *convergens*.
- Vittæ black, gradually approaching behind .....7. *tomentosa*.
- Vittæ black, not united at tip.....8. *virgata*.
- Yellow margin of elytra not extending to the tip.....9. *brevicollis*.

1. *T. nitidicollis*, luteo-testacea, occipite subtiliter punctato, nigro-maculato, thorace latitudine vix duplo brevior, convexo lævi polito, angulis haud prominulis, disco utrinque oblique impresso, guttis tribus nigris signato, elytris subtiliter dense punctulatis et pubescentibus, vitta suturali alteraque submarginali angustis cyaneo-nigris mox ante apicem conjunctis; antennis fasciis. Long. .42.

One specimen collected in New Mexico by Mr. Fendler. Easily distinguished by the characters above given. The elytra are very little wider than the thorax, and the sutural angle is slightly prominent, while in all the following species it is rounded.

2. *T. canadensis*. *Galeruca canadensis* Kirby, Fauna Bor. Am., iv. 219.

A common species, extending from Lake Superior and the Mississippi Valley to the Pacific. The black vittæ are regular, and generally are united near the 1865.]

tip, though sometimes they are entirely separate. It is easily distinguished from all the following, except *T. luteocincta*, by the extremely fine punctation of the elytra.

The sculpture and form of the thorax is subject to some variation; there is sometimes an impressed dorsal line, and the angles are occasionally quite prominent.

3. *T. luteocincta*. *Galleruca luteocincta* Lec., Proc. Acad. Nat. Sci. Phila., 1858, 88.

Very abundant at San Diego, California, upon a species of *Artemisia*. I have also received it from Santa Cruz, Cal. The elytra are generally green or bronzed, with the sides and apex broadly margined with yellow; individuals occur, however, in which the vittæ are well defined, and which can only be distinguished from *T. canadensis* by the thorax being more shining, with larger scattered punctures, and by the color of the elytral vittæ, which are always dull black in the preceding, while they are greenish blue or bronzed in the present species.

4. *T. flavolimbata*. *Galleruca flavolimbata* Mann., Bull. Mosc., 1843, 308. Northern and middle California. For a type I am indebted to the kindness of Col. Motschulsky. Differs from the preceding by the elytra being of a beautiful blue color and less finely punctured. I have seen no variation in color, though specimens will probably occur having the blue disc of the elytra divided into vittæ.

5. *T. attenuata*. *Galleruca attenuata* Say, Journ. Acad. Nat. Sci., iii. 459; ed. Lec., ii. 223.

Kansas. Larger than the next species, and with the elytra more finely punctured, being in this respect intermediate between *T. flavolimbata* and *T. canadensis*. The discoidal vitta of the elytra is gradually widened behind, and becomes confluent with the sutural one about one-third from the apex, (very much as in *T. baccharidis*) in the two specimens before me.

6. *T. convergens*, testacea, pallide pubescens, occipite parce punctato nigro, thorace latitudine duplo brevior, angulis vix prominulis, disco parce grosse punctato, utrinque oblique profunde impresso, lineâ dorsali brevi impressa, maculis tribus magnis ornato, elytris fortius dense punctatis, vitta suturali alteraque discoidali latius cyaneis vel viridibus, hac pone medium sensim dilatata; pectore abdomineque sæpissime fuscis, antennis nigris basi testaceo-maculatis. Long. 24—28.

Kansas; Nova Scotia, Mr. Ulke. A widely diffused species, easily recognized by its small size and rather coarse punctures.

The dorsal vitta of the elytra is dilated behind in most specimens, but does not render the pale vitta shorter than in other species but merely attenuates it behind the middle. In some of the specimens from Nova Scotia, the blue vittæ are not united even at the tip, thus showing the same variation already noted under *T. canadensis*.

7. *T. tomentosa*. *Chrysomela tomentosa* Linn., Syst. Nat., ed. 12mo., i. ii. 601. *Galleruca baccharidis* Weber., Obs. Ent., 57; Fabr., Syst. El., i. 480; Oliv. Ent., vi. 629, pl. 3, 34.

Occurs near the sea coast from New York to Florida. In all the specimens before me, the discoidal black vitta of the elytra is dilated behind, and becomes confluent with the sutural vitta about one-fourth or one-fifth from the apex. It is easily distinguished by the very prominent thoracic angles causing the sides to become quite sinuous. The description of Linnaeus, which is quite characteristic, seems to have been overlooked, except in the Melsheimer Catalogue.

8. *T. virgata*, testacea, subtiliter pubescens, capite parce punctato, oc-

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cipite nigro, thorace latitudine duplo brevior, angulis parum prominulis, disco vage punctato, utrinque profunde oblique impresso vix canaliculato, maculis tribus magnis nigris ornato, elytris dense punctatis, vitta suturali alteraque submarginali latis nigris apice haud conjunctis; antennis nigris basi testaceo-maculatis; subtus fusco-testacea incisuris tarsorum obscuris. Long. .36.

Middle and Southern States. Distinguished from *T. baccaridis* by its smaller size, not prominent thoracic angles, and not convergent elytral vitta. Resembles in elytral markings *T. canadensis*, but at once known by the more strongly punctured elytra.

9. *T. brevicollis*, fusco-testacea, occipite parce punctato nigricante, thorace latitudine triplo brevior, angulis anticis prominulis, disco rugose punctato utrinque oblique profunde impresso, maculis tribus magnis nigris ornato, elytris confertissime subtilius punctatis, vitta suturali alteraque laterali latis nigris; margine laterali a humero usque ad medium testaceo; antennis nigris, articulis baseos subtus testaceis; corpore subtus fusco, pedibus testaceis, fusco-maculatis. Long. .31—.38.

Abundant in the Southern States, near the sea coast, one specimen from Kansas. Easily known by the very short thorax and by the black vitta extending to the lateral margin of the elytra, from the middle to the apex, which is therefore not margined with yellow, as in the other species.

MONOXIA Lec.

This genus contains small testaceous species, densely clothed with yellow hair, and easily recognized by the unguis being neither cleft, nor appendiculate.

The body is elongate, convex; the head is destitute of the usual impressed lines, the front narrow, not carinate; the maxillary palpi are rather slender, with the last joint conical, acute, and a little longer than the preceding. The antennæ are stout, with the third joint longer than the fourth; the second joint is half as long as the third. The thorax is rounded on the sides, with the angles prominent, and the disc broadly channelled, with two discoidal impressions. The elytra are wider than the thorax, distinctly margined, as in the smaller species of *Galleruca*, with the epipleuræ sharply defined, and extending to the tip. Pygidium perpendicularly deflexed in both sexes. Front coxæ contiguous, conical, prominent; tibiæ not sulcate externally, unguis slender, acute, not toothed, nor dilated at base, in one section, with a small acute tooth not divergent as in *Galleruca* in the second section. The deflexed pygidium readily distinguishes this genus, and gives to the ventral surface somewhat the appearance observed in genera allied to *Clythra*.

- A. Unguis slender and entirely simple;
  - Angles of prothorax very prominent..... 1. *angularis*.
  - Angles of prothorax not prominent;
    - Elytra not impressed..... 2. *obtusa*.
    - Elytra impressed..... 3. *guttulata*.
- B. Unguis stouter, with an acute tooth near the tip;
  - Elytra uniformly convex..... 4. *debilis*.
  - Sides compressed, disc obliquely impressed;
    - Elytra strongly punctured ..... 5. *conspuata*.
    - Elytra finely punctured..... 6. *sordida*.

1. *M. angularis*. *Galleruca angularis* Lec., Proc. Acad. Nat. Sci. Phil., 1859, 90.

California, near San Francisco? given me by Mr. S. S. Rathvon. Easily distinguished by the very prominent angles of the prothorax. The elytra are finely and densely punctured, and not impressed.

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2. *M. obtusa*, testacea, pallide pubescens, thorace fortiter dense punctato, latitudine duplo brevior, lateribus rotundatis, angulis posticis obtusis, apice summo dentiformi prominulo; disco canaliculato et utrinque late impresso, elytris dense punctatis, punctis antice fortioribus; antennis extrorsum, pectore abdomineque infuscatis. Long. 20.

One specimen from Andover, Mass., (Mr. Sanborn,) and two from Kansas. Of the same size as the preceding and following, but differs from *M. angularis* by the angles of the thorax not being prominent; from *M. guttulata* by the elytra not being impressed at the sides and on the disc; and from both by the elytra being not distinctly dotted with black. The punctuation is stronger than in *M. angularis*, and about the same as in *M. guttulata*. The disc of the prothorax is sometimes slightly fuscous.

3. *M. guttulata*. *Galleruca guttulata* Lec., Rep. Pacific R. R. Expl., 70.

One specimen found by me at San Francisco. Similar in size and shape to *M. angularis*, but the angles of the thorax are not prominent, and the elytra are compressed at the sides, and obliquely impressed behind the humeral elevations.

4. *M. debilis*, pallide testacea, dense pallide pubescens, thorace latitudine duplo brevior, lateribus rotundatis, angulis posticis minutis prominulis, disco dense punctato late canaliculato, utrisque vage impresso, elytris thorace latioribus, profunde punctatis, punctis antice fortioribus, punctis parvis nigris serie 4-pliici utrinque ornatis, transversim convexis; antennis extrorsum fuscis. Long. 16—18.

New Mexico, Mr. Ulke. The pubescence is dense and somewhat silvery. The black dots of the elytra are minute, and those of the subventral series usually coalesce, forming a narrow, abbreviated line; the humeri are prominent and marked with a larger black spot.

The fifth ventral segment of the male is deeply and narrowly incised.

This species most closely resembles in appearance *M. obtusa*, but the claws are distinctly cleft, with the inner portion acute and shorter than the outer one.

I am disposed to think that *G. puncticollis* Say, (Journ. Acad. Nat. Sci., iii. 458; ed. Lec., ii. 222,) is allied to this species, but the elytra are described as having two vittæ on each, which are frequently obsolete, and the tibiæ and tarsi are black. The comparison made by Say with *G. baccharidis*, to which it has no relation whatever, has rendered the species obscure.

5. *M. consputa*. *Galleruca consputa* Lec., Rep. Pacific R. R. Expl., 70.

San Jose and San Francisco, Cal., on oak leaves. Smaller and narrower than *G. debilis*, with the elytra coarsely punctured, the sides compressed and impressed, and the disc obliquely impressed behind the humeri.

6. *M. sordida*. *Galleruca sordida* Lec., Proc. Ac. Nat. Sc. Phil., 1858, 88. Colorado Desert, California, two specimens. Very similar in form and color to *G. consputa*, but the elytra are finely punctured, with the punctures almost concealed by the dense golden pubescence.

The fifth ventral segment of the male in both species is incised at the tip.

Prodrurus of a Monograph of the Species of the Tribe ANOBIIINI, of the Family  
PTINIDE, Inhabiting North America.

BY JOHN L. LE CONTE, M. D.

In the classification of the Coleoptera of North America, published by the Smithsonian Institution, I proposed, in 1862, an arrangement of the insects allied to the old genus *Anobium*, by which the number of genera was

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largely increased. My views were not noticed in the excellent work of Duval,\* on the genera of the Coleoptera of Europe, in which, with the addition of some genera not represented in our fauna, the classification remains as before. I subsequently learned, by the reception of the very valuable work of C. G. Thomson,† on the Coleoptera of Skandinavia, that several of the genera recognised by me had been previously described by him, and, in fact, so far as his arrangement is applicable to our fauna, I have had occasion to make no changes in the genera as limited by him. Within a few weeks I have received a copy of the admirable work of Mulsant and Rey,‡ on the Terebriles of France, which would, indeed, have been exhaustive, if it had not happened unfortunately, that the work of Thomson, above mentioned, remained unknown, to the authors. The result is that all of the genera described by Thomson have received new names in this later memoir.

It has been my endeavor, in the present brief treatise, to harmonise, with the material before me, the views and names contained in the three works quoted, and at the same time to arrange the genera in a more natural manner than has been heretofore proposed.

It has seemed to me that the genera form a nearly regular series, represented by species, more or less numerous, from those in which the members (antennæ and legs) are but slightly contractile, to those in which all are received in appropriate excavations of the trunk; from those in which the head is scarcely deflexed, to those in which the mandibles in repose fit against the mesosternum, shutting in the under surface of the head and prothorax.

Considering the variation in form and structure of the antennæ, in genera which are evidently closely related, I have regarded the manner in which the body is contracted in repose as of fundamental importance in the classification of the genera.

I divide them, therefore, as follows :

- A. Head received in repose upon the under surface of the prothorax..... group *ANOBIÆ*.
    - Prothorax not excavate beneath, head free.. subgroup *Dryophili*.
    - Prothorax excavated beneath, for reception of head..... subgroup *Anobia*.
  - B. Mandibles in repose, resting against the mesosternum..... group *Xyletini*.
    - Head excavated beneath for reception of antennæ..... subgroup *Xyletini*.
    - Antennæ received between the coxæ..... subgroup *Dorcatomata*.
- In all the subgroups, excepting the first, (in which the contractile power is feebly developed,) there is great difference between the genera in the mechanism adopted for the protection of the antennæ, and a regular gradation in the power of contractility, as will be readily observed by looking at the tables of genera given below.

*Anobium pudicum Boheman*, Eugenie's Resa, 86, is said to have been collected in California, but as the localities of the insects of the expedition seem to have been confused, it may be regarded as a doubtful member of our fauna. (Vide *Eupactus*.)

I have excluded *Ptilinus* from this tribe; it seems to me, as stated in the Classification of Coleoptera of North America, to represent a separate tribe, leading to the subfamily *Bostrichidæ*.

SUBGROUP I. *DRYOPHILI*.

In the species of this group the body is elongate, the head capable of being

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\*Genera des Coléoptères d'Europe, par M. Jacquelin Du Val, (Camille.)  
 †Scandinaviens Coleoptera synoptiskt bearbetade af C. G. Thomson. Lund, 1859—'60.  
 ‡Hist. Naturelle des Coléoptères de France, Térébriles par M. Mulsant et Cl. Rey. Paris, 1866.  
 1866.]

only moderately deflexed; the prothorax not excavated beneath for its reception, and the legs not received in cavities.

The antennæ have the intermediate joints narrow, and the last three dilated and sometimes much elongated; they are not received between the coxæ in repose, but rest loosely upon them, and are 11-jointed in our genera. The anterior aperture of the prothorax is circular. In our genera the thorax is margined, and the elytra are not striate, though European genera exist in which these characters are wanting. The ventral segments are never connate.

Our genera are related as follows:

Anterior coxæ contiguous, prominent, conical..... *Ernobius*.

Anterior coxæ separated by the prosternum:

Prosternum moderate, tarsi narrow..... *Ozognathus*.

Prosternum very short, tarsi dilated..... *Xestobium*.

*ERNOBIUS* Thoms., Skand. Col. i. 88, (1859); v. 146, (1863.)

This genus, first recognized by C. G. Thomson, in his excellent work on the Coleoptera of Skandinavia, has been since described by other authors, as follows: *Liozoum Mulsant & Rey*, opusc. Ent. xiii. 92, (1863); *Coléopt. de France, Terebites*, 133, (1864); *Dryophilus Lec.*, Class. Col. 205, (1862); *Philoxylon Lec.*, *ibid.*; *Conophoribium Chev.*, Ann. Ent. Tr., 1861, 391.

I divided the species into two genera, on account of the difference in the length of the prosternum in front of the coxæ, but a renewed examination convinces me that this character is of merely specific value.

The genus will be readily recognized by the characters above given. In addition to them, the middle coxæ are nearly contiguous, the tibiæ are slender, the tarsi are narrow, with the first joint elongated, and the fifth joint not dilated, but slender and elongated. The plates of the hind coxæ are very narrow, and not dilated internally. The sixth ventral segment can usually be seen.

The species known to me may be grouped as follows:

Ninth joint of antennæ shorter than the 4th—8th united; (joints 5—8 equal in thickness);

5th and 7th longer than sixth;

Thorax not transversely impressed;

Sides of thorax much rounded.....1. *mollis*.

Sides of thorax less rounded.....2. *punctulatus*.

Thorax with a vague transverse impression .....3. *alutaceus*.

Joints 6th, 7th and 8th equal in length.....4. *debilis*.

9th joint of antennæ as long as the 4th—8th united:

Elytra densely finely granulated.....5. *granulatus*.

Elytra finely not densely punctulate.....6. *marginicollis*.

9th joint of antennæ as long as the 1st—8th united...7. *tenicornis*.

1. *E. mollis* Thoms., Skand. Col. v. 146; *Dermestes mollis* Linn.; *Anobium molle* Fabr., &c.; *Liozoum molle?* Muls. & Rey; *Anobium convexifrons* Mels., Proc. Acad. Nat. Sci., ii. 309.

A common European species, introduced in the Atlantic States. The thorax is twice as wide as its length, and is much rounded on the sides, which are broadly margined; all the angles are rounded; there are two vague rounded basal impressions, and a scarcely perceptible medial elevation.

The fifth joint of the antennæ is longer than the fourth, the fifth to the eighth joints are equal in thickness, oblong, and the sixth is shorter than the adjoining ones; the eighth is a little shorter than the seventh, the ninth, tenth and eleventh are equal in length, and each is a little longer than the seventh and eighth united.

2. *E. punctulatus*. *Anobium punct.* Lec., Proc. Acad., 1859, 284.

California. Related to the preceding, but the thorax is more transverse,

[Ost.



with the sides much less rounded, and the elytra are less densely punctulate; the disc of the thorax is obsoletely channelled behind the middle. The proportion of the joints of the antennæ seems scarcely different from *E. mollis*.

3. *E. alutaceus*. *Philozyton alut.* Lec., Proc. Ac. 1861, 352.

California, one specimen. More elongate than the two preceding species, with the sides of the thorax considerably rounded, but the anterior angles more distinct, and less rounded; the disc is marked with a vague transverse impression in front of the middle; the elytra are scarcely distinctly punctulate. The joints, 5—8 are less unequal in length than in *E. mollis* and punctulatus; the ninth is equal in length to the three preceding united, and but very little wider.

4. *E. debilis*, oblongus, testaceus, nitidus, dense pallide pubescens, capite thoraceque granulato-punctatis, hoc latitudine plus duplo brevior, lateribus explanatis late rotundatis, angulis omnibus rotundatis, basi utrinque vage impresso, linea dorsali pone medium lævi, scutello tomentoso, elytris punctulatis, thorace haud latioribus: antennis articulo 5to sequi longiore, 6—8vo æqualibus, 9mo—11mo præcedentibus duobus conjunctis singulo longioribus et latioribus. Long. .10.

One specimen from Sta. Barbara, and one from Sta. Cruz Island, California, collected by Mr. C. M. Bacha. As stout in form as *E. punctulatus*, but readily distinguished by the smaller size and different proportion of the joints of the antennæ; the third joint is equal to the fifth, the fourth is somewhat shorter and about equal in length to the sixth; the seventh and eighth are each equal to the sixth; the ninth, tenth and eleventh are about equal in size, and broader than the preceding joints, each one is longer than the seventh and eighth united, and the three together are about equal in length to the joints 2—8 united.

5. *E. granulatus*, rufescente-fuscus, pube brevi sericea vestitus, subopacus, subtiliter dense granulato-punctatus, thorace latitudine plus duplo brevior, lateribus et angulis rotundatis, disco obsolete canaliculato, versus apicem, et ad medium vage transversim impresso, elytris thorace haud latioribus; antennis testaceis articulis 4 et 5 æqualibus, 6, 7, 8 æqualibus minoribus, 9mo præcedentibus 5 haud brevior. Long. .20.

One specimen, collected in Florida by Dr. J. G. Cooper. Quite distinct from all others known to me, by the upper surface being finely granulated; the antennæ are very nearly as in *E. marginicollis*, but the third joint is one-half longer than the fourth, the fourth and fifth are equal, and together are as long as the sixth, seventh and eighth; the ninth is fully as long as the five preceding united. The form is less elongated than *E. marginicollis*, and is even a little stouter than *E. mollis*.

6. *E. marginicollis*. *Anobium marg.* Lec., Proc. Acad., 1859, 87.

One specimen, Oregon. Of much more elongate form, and readily distinguished by the joints of the antennæ, 3—5 being equal in length, 6—8 shorter, (the seventh being very slightly longer than the others) scarcely longer than their width, the ninth as long as the five preceding united, and but slightly broader; tenth and eleventh each equal in length to the ninth. The thorax is narrower than the elytra, the sides broadly margined, the angles rounded, the disc vaguely impressed in front, and feebly channelled behind; the elytra are very finely punctulate, the prosternum is less abbreviated than in the preceding species, and the fifth joint of the tarsi somewhat shorter.

7. *E. tenuicornis*, modice elongatus, fuscus, nitidus, dense pallide pubescens, capite thoraceque fere opacis, confertim granulatis, hoc latitudine duplo brevior, antrorsum angustiore, lateribus valde rotundatis angustius  
1865.]

explanatis, scutello tomentosus, elytris thorace paulo latioribus, dense punctulatis; oculis (♂) maximis, antennis articulis 9—11 linearibus, singulo præcedentibus conjunctis longiore. Long. .18.

York Co., Pennsylvania; one male, given me by Dr. Melsheimer. Easily recognized by the characters given above. The second and fifth joints of the antennæ are equal, and a little longer than their width, the sixth to the eighth joints are shorter, transverse and closely connected; the ninth is not wider than the others, linear and very elongate, being longer than all the preceding united; the tenth and eleventh are each equal to the ninth. The prosternum in front of the coxæ is less abbreviated than in the species 1—4; the last joint of the tarsi is longer than usual. The form is less elongated than in *E. marginicollis*.

I have single individuals, indicating two other species, which seem closely allied to what I have considered as *E. mollis*, but I am unwilling to describe them, until the discovery of other specimens will enable the specific characters to be defined with greater precision.

*OZOGNATHUS* Lec., Class. Col. N. Am., 205, (1862.)

In this genus the anterior coxæ are narrowly separated by the prosternum, which, in front of the coxæ, is longer than usual; the coxæ themselves are oval, and not very prominent; the middle coxæ are well separated by the mesosternum, which is flat, declivous and obtusely triangular. The metasternum is deeply channelled behind; the hind coxæ are very narrow externally, and moderately dilated internally, with the hind margin obtusely angulated; the sixth ventral segment is visible. The tarsi are narrow, with the last joint elongated.

The antennæ are alike in both sexes, less than half the length of the body, the joints 3—8 nearly equal in size but with the fifth and seventh somewhat stouter, not longer than their width; the ninth is as long as the three preceding united, and double their width; the tenth is about equal in size to the ninth, and the eleventh a little longer; united they are about equal in length to all the preceding joints together. The eyes are small, convex and prominent.

The male differs from the female, by each mandible being armed at its base by a slender cylindrical horn, as long as the head, which rises perpendicularly, and is inflexed and acute at the tip, meeting the horn of the opposite side.

1. *O. cornutus* Lec., Class. Col. N. Am., 206; *Anobium corn.* Lec., Proc. Acad., 1859, 87.

California. Sent me by Mr. Andrew Murray, as having been hatched from some galls received by him from California.

1. *O. misellus*, niger, nitidus, tenuiter pubescens, capite thoraceque punctulatis, hoc convexo, latitudine duplo brevior, lateribus late rotundatis, elytris parce punctulatis, antennis basi, tibiis tarsisque piceo-testaceis. Long. .05

One female found by me at San Diego, California. Differs by its very much smaller size, less dense punctures, and by the hind angles of the thorax not being acutely prominent.

*XESTOBIUM* Motsch.

Bull. Mosc., 1845, 1. 35. Muls. and Rey., Col. de France, Tereidiles, 119.

*Synonym.* *Cnecus* Thoms., Skand. Col., i. 88, (1859;) v. 145, (1863.)

As in the preceding genus, the anterior coxæ are oval, not prominent, and separated by the prosternum, which, however, is very short in front of the coxæ. The middle coxæ are well separated by the mesosternum, which is obtusely triangular. The metasternum is somewhat channelled behind; the plates of the hind coxæ are widely separated and suddenly dilated internally,

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and the posterior margin is obtusely angulated, as in *Ozognathus*. But five ventral segments are visible. The tarsi are broad, shorter than the tibiæ, the first joint longer, the last joint dilated, furnished with a dense brush beneath; the claws are distant and minute.

The name *Anobium Fabr.*, should be retained for this genus, as it is not only the first species described under the genus, (*vide Fabr., Ent. Syst. and Syst. El.*) but is the one which Olivier has assumed for the type, and from which his drawings of the trophi were made. Nevertheless, with a view of disturbing the synonymy less, other species have been assumed by European authors as the types of the genus, and I have refrained from restoring the generic name to the imported species, by which alone it is thus far represented on this continent.

1. *X. tessellatum Motsch.*, Bull. Mosc., 1845, i. 35; Muls. and Rey, Col. Fr. Térédiles, 122. *Anobium tessellatum Fabr.*, Ent. Syst., i. 236; Syst. El., i. 321; Oliv. Ent., ii. 16, tab. 1, fig. 1, &c. *Cnecus tessellatus* Thoms., Skand., Col., v. 145.

Introduced from Europe into the Atlantic States. Our largest species, and varies considerably in size.

Sub-Group II. *ANOBIA*.

The body is usually elongate in form; the head capable of being strongly deflexed, and resting in repose in the excavated under surface of the prothorax; the antennæ are received between the anterior and middle coxæ, in a more or less distinct excavation, which is sometimes prolonged into the metasternum. The mandibles do not reach the metasternum in repose, the head is convex beneath, and not excavated for the reception of the antennæ. The antennæ have the last three joints generally larger, and the stem usually not serrate, though these characters vary much. The anterior opening of the prothorax is circular; the epipleuræ are foveate in *Petalium* and *Theca*; and the hind feet received in excavations of the first ventral segment in *Theca* and *Eupactus*.

The genera are numerous. Those found in the United States may be grouped as follows:

- I. First ventral segment not excavated for reception of hind feet.
  - A. Metasternum not excavated in front;
    - a. Antennæ not received between the coxæ, but resting upon them;
      - Anterior coxæ contiguous; antennæ 9- or 10-jointed *Oligomerus*.
      - Anterior coxæ nearly contiguous; antennæ 11-jointed..... *Sitodrepa*.
    - b. Antennæ received between the coxæ, which are distant;
      - Antennæ subpectinated..... *Ctenobium*.
      - Antennæ not pectinated;
        - Thighs strongly clavate, tarsi dilated ..... *Ptinodes*.
        - Thighs not clavate, tarsi dilated;
          - Claws armed with a broad tooth ..... *Trichodesma*.
          - Claws not toothed ... ..... *Nicobium*.
        - Tarsi slender, thighs not clavate ..... *Hadrobregmus*.
  - B. Metasternum deeply excavated in front;
    - Antennæ not serrate, last joints elongated..... *Anobium*.
    - Antennæ serrate, last joints scarcely longer..... *Trypopyta*.
  - C. Metasternum produced in front into a large lobe.. *Petalium*.
- II. First ventral segment excavated for reception of hind feet;
  - Mesosternum carinate, epipleuræ foveate at middle.. *Theca*.
  - Metasternum emarginate, epipleuræ not foveate..... *Eupactus*.

## OLIGOMERUS Redt., Fauna Austr.

Muls. and Rey., Col. Fr. Térédiles, 198.

The European species, *O. brunneus*, has 10-jointed antennæ, but I have recently discovered a species which, without showing any other structural difference, has but nine joints in the antennæ.

The species resemble in the form of antennæ certain *Hadrobregmi*, but may be at once distinguished by the anterior as well as the middle coxæ being contiguous, without any intervening cavity for the reception of the antennæ.

The species before me may be separated as follows :

Sides of thorax feebly serrate, disc scarcely gibbous..... 1. *sericans*.

Sides of thorax distinctly serrate ;

Disc slightly gibbous ; antennæ — ..... 2. *obtusus*.

Disc strongly gibbous ; antennæ 9-jointed..... 3. *alternans*.

1. *O. sericans*. *Anobium sericans* Mels., Proc. Acad. Nat. Sci., ii. 309. *O. thoracicus* Lec., Class. Col. N. Amer., 205.

Middle States. I received a specimen of this species from Dr. Melsheimer under the name *A. thoracicum*, and in citing it did not refer to his original description, by which it appears that the name is a synonym of his *A. sericans*. It will be readily distinguished from the other species by the thorax being but feebly serrate on the sides, with the hind angles not obvious, and the disc very feebly elevated behind the middle, being scarcely gibbous. There are five small but distinct joints between the second joint, and the elongate ones ; the antennæ are therefore 10-jointed. The striæ of the elytra are strongly punctured, the outer ones are deep, and those towards the suture shallow ; both punctures and striæ become obsolete at the tip.

2. *O. obtusus*, *elongatus*, *cylindricus*, *fusco-ferrugineus*, *subtiliter sericeo-pubescentis*, *thorace lateribus serratis*, *angulis posticis obtusis*, *distinctis*, *disco punctulato*, *opaco*, *ante basin modice elevato* ; *elytris apice subtruncatis*, *striis punctatis*, *apice haud oblitteratis*, *externis profundioribus*. Long. .02.

One specimen from Vermont, Prof. C. B. Adams. Larger than the preceding, of a different color, and quite distinct by the form and sculpture of the thorax, which is distinctly and densely punctulate, more convex, with the disc more elevated in front of the base ; the sides are more distinctly serrate, the hind angles are obtuse, and but slightly rounded ; the reflexed side margin is narrow, and the transverse impressions at the anterior angles are deeper. The antennæ are mutilated, but appear to have been 10-jointed.

3. *O. alternans*, *nigro-piceus*, *opacus*, *pube brevi fusco-cinerea sericea dense vestitus*, *thorace latitudine fere duplo brevior*, *punctulato*, *lateribus serratis valde rotundatis*, *angulis posticis haud distinctis*, *disco valde convexo*, *leviter canaliculato*, *postice elevato*, *gibboso*, *et utrinque impresso*, *elytris striis fortiter punctatis externis profundis*, *interstitiis 1mo, 3io, 5to et 7mo prominulis versus apicem subreticulatim connexis* ; *antennis 9-articulatis*. Long. .20.

One specimen found by me on a fence near Long Branch, New Jersey, July, 1865. This species is very distinct, not only by the strongly gibbous thorax, but by the peculiar sculpture of the elytra ; the striæ are more impressed than in the other species ; the sutural interval and the alternate ones, as far as the seventh, are more convex than the intervening spaces, and are irregularly connected towards the tip by a few anastomosing elevated lines. The antennæ are fusco-testaceous ; the third joint is nearly as long as the three following, which are short, but quite distinct ; they are followed by the elongated joints, each of which is as long as the joints 1—6 united, and about

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twice as broad, though the first of them is broader than the other two, and is somewhat triangular in form; the antennæ are but 9-jointed, the seventh joint, which is conspicuous in the other species, being probably the one which becomes obsolete. The eyes are larger and more prominent than in the specimens of the other species before me, which are females; the under surface of the head, as in them, is coarsely punctured at the sides, and finely rugose longitudinally in the gular space.

SITODREPA Thoms. Skand. Col., v. 166, (1863.)

*Synonym.* Anobium Lec., Class. Col., 204. Anobium, subg. Artobium Muls. and Rey., Col. France, Térédiles, 114.

This genus contains but a single species, which has been introduced from Europe in flour, bread, and other articles of commerce, to all parts of the globe. As it is the most common and the best known species of the Fabrician genus Anobium, I preferred, in separating the genera, to retain the original name for this one. It has, however, since been designated by a distinct name in the excellent treatise of Thomson, above cited, and is, moreover, no more entitled to be regarded as the type than any other of the species chosen by Thomson, Duval, or Mulsant; under these circumstances, I think it proper to adopt the generic name proposed by Thomson.

The genus will be readily recognized by the moderately stout form, and the nearly contiguous anterior coxæ, which are conical and prominent; the middle coxæ are but slightly separated by the obtusely triangular mesosternum; the metasternum is finely channelled; the segments of the abdomen are free, and the plates of the hind coxæ moderately dilated inwards. The elytra are finely striate, and the striæ are punctured; the outer striæ are deeper, and the margin near the base is somewhat prominent. The antennæ are 11-jointed, rather short, with the last three joints together about equal in length to the others in the female, but longer in the male. The tarsi are narrow, with the joints gradually decreasing in length, the fifth is not slender.

1. *S. panicea* Thoms., Skand. Col., v. 166; *Dermestes pan.* Linn.; *Anobium pan.* Fabr., &c.; *Anobium (Artobium) panum* Muls. and Rey., Col. France, Térédiles, 114.

*An. tenuistriatum* Say, Journ. Acad. Nat. Sci., v. 173; Ent., (ed. Le Conte,) ii. 288. *An. obesum* Mels., Proc. Acad. Nat. Sci., 309.

Common throughout the United States and Canada; found also in Lower California, at Cape San Lucas, by Mr. Xantus. The sides of the thorax are distinctly serrate.

#### CTENOBIUM, n. gen.

Body slender, cylindrical; prothorax deeply excavated beneath for reception of head, which is received in repose upon the anterior coxæ. Antennæ 11-jointed; first joint thicker, nearly cylindrical; second smaller and shorter; third equal in length to the second, triangular, about as broad as its length in the female; fourth to eighth transverse, with the outer angle acutely prolonged in the female, with the fifth and seventh more prolonged than the others; in the male the third to eighth joints are prolonged externally into a cylindrical branch, twice as long as the joint itself; the ninth and tenth joints are compressed, elongate triangular, and as broad as the prolongations of the preceding joints; the eleventh joint is long, oval, and compressed; the three last joints together are equal in length to all the preceding united, in both sexes, and are much longer in the male than the female. Prosternum narrowly separating the anterior coxæ, which are conical and prominent; middle coxæ narrowly separated by the mesosternum, which is obtusely rounded behind; metasternum deeply channelled behind; hind coxæ with the plates narrow, nearly parallel, not dilated inwards; tibiæ 1865.]

slender, not compressed; tarsi longer than the tibiæ, narrow, first joint elongated, last joint short, somewhat dilated, claws slender. Abdomen with the ventral segments not connate, equal in length, tip of fifth segment conical, and prominent in both sexes.

The last joint of the maxillary palpi is elongated, and obtusely subtruncate at tip.

This genus seems closely allied to *Oligomerus*, but the anterior coxæ are somewhat separated, and the antennæ are very different. The elytra are striate, and the punctures of the inner striæ are confused, as in *Oligomerus sericans*.

1. *Ct. antennatum*. Elongatum, cylindricum piceum opacum, pube subtili sericea vestitum, thorace latitudine sesqui brevior, dense subtiliter scabro, lateribus cum basi late rotundatis, disco fere ad basin canaliculato, dein acute elevato, basi vage 4-impresso, elytris thorace 4-plo longioribus, striis punctatis, externis profundis, internis subconfusis; antennis pedibusque ferrugineis. Long. .20—.25.

Mas antennis corporis dimidio longioribus, articulis intermediis longius pectinatis.

Femina antennis corporis dimidio fere brevioribus, articulis intermediis breviter pectinatis.

Virginia: four specimens kindly given me by Dr. S. Lewis. The sides of the thorax are not serrate, the reflexed margin is very narrow, and extends around the anterior angles upon the apex. The disc is convex, gibbous, strongly channelled until within a short distance of the base, where it is interrupted by the gibbosity; the latter is bounded behind by two converging impressions, outside of which on each side is a feeble elevation, and then a transverse impression, extending to the sides. The hind angles are not obvious. The internal striæ of elytra are not impressed, and their punctures are confused; the striæ near the margin are impressed and regular punctured.

#### PTINODES Lec., Class. Col., 204.

Body elongate, convex, pubescent, and clothed with long, erect hairs. Prothorax excavated beneath for the reception of the head, disc gibbous, not channelled. Eyes convex, moderate in size, prominent. Antennæ rather stout, joints 3—8 nearly equal, the outer ones slightly transverse; ninth and tenth each longer than the three preceding, and somewhat wider, oblong; eleventh a little longer, oval. The ninth to tenth somewhat longer than all the preceding united. Prothorax narrowed behind, not contiguous to the trunk; prosternum obtusely truncate behind, separating widely the anterior coxæ, which are conical and prominent; middle coxæ prominent, well separated by the mesosternum, which is truncate (?) behind; metasternum not sulcate; hind coxæ with the plate very narrow, scarcely visible. Abdomen with the ventral segments smooth, sparsely hairy, not connate, the fourth shorter than the others, which are equal. Thighs strongly clavate, tibiæ not compressed, with external rows of long hairs; tarsi shorter than the tibiæ, stout, first joint very slightly elongated, fifth joint dilated, claws broadly dilated at base.

The separation between the prothorax and trunk, as well as the clavate femora, easily distinguish this genus, and cause the resemblance to *Ptinus*, which has suggested the name.

1. *Pt. setifer* Lec., Class. Col., 205; *Anobium setiferum* Lec., Proc. Acad. Nat. Sci., 1858, 73.

One specimen was collected by me at San Diego, California.

#### TRICHODESMA Lec.

Body oblong, rather stout, pubescent, and clothed with erect setæ and tufts

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of fine dense hair; prothorax gibbous above and marked with small rounded tubercles, excavated beneath for the reception of the head. Elytra granulate, and with indistinct rows of large punctures. Eyes small, convex; antennæ 11-jointed, last three joints elongated, not longer together than all the preceding united in the female, but longer in the male; first moderately dilated, second not so stout, and shorter than the first, third as long as the second, but more slender, fourth to eighth nearly equal, oblong, a little longer than their width. Prosternum widely truncate behind, anterior coxæ distant, small, rounded, prominent; mesosternum broadly concave, with a slightly elevated ridge each side beyond the middle coxæ, which are widely separated; tip broadly truncate, closely joined with the metasternum; the latter is marked with a very short furrow behind; the hind coxæ are distant, and their plates are moderately and somewhat suddenly dilated inwards. The ventral segments are not connate, though they appear more closely united than usual; the second and third segments are a little longer than the others. Legs rather short, thighs feebly clavate, tibiæ slender, pubescent, and with fringes of long hairs; tarsi short, broadly dilated, joints about equal in length, fifth broad, triangular, hairy beneath like the others, claws distant, dilated at base into a broad semi-transparent tooth. The last joint of the palpi is broadly truncate at tip.

1. *T. gibbosum* Lec., Class. Col., 205. *Anobium gibbosum* Say, Journ. Acad. Nat. Sci., v. 171, (ed. Le Conte, ii. 280.)

Middle States. Our most conspicuous species.

#### NICOBIUM Lec., Class. Coll., 204, (1862.)

*Synonym.* *Anobium*, subgenus *Neobium*, *Muls. and Rey.*, Col. France, Térédiles, 106, (1864.)

This genus, represented only by the introduced European *Anobium hirtum*, differs from the preceding by the less gibbous thorax, the claws not toothed, but slightly broader at the base, and by the regularly striate elytra. The form of body is rather stout and convex, with the thorax separated from the elytra and a little narrower than them. The sterna, coxæ, and tarsi are as in *Trichodesma*, but the thighs are not at all clavate, and the claws are not appendiculate.

1. *N. hirtum*. *Anobium hirtum* Illiger, Mag. vi. 19, &c. *An.* (*Neobium*) *hirtum* Muls. and Rey., Térédiles, 106.

I have one specimen in my collection, marked as found in the Southern States, probably in Georgia; it is incorrectly referred to in the Class. Col. N. America, p. 205, as *Anobium sericeum* Muls.

The species will readily be recognized by the stria composed of large quadrate punctures, and the interstices furnished with single rows of sub-erect hairs, longer than the pubescence.

#### HADROBREGMUS Thomson, Skand. Col., i. 89, (1859.)

*Synonyms.* *Hemicælus*, p. Lec., Class. Coll. N. Am., 204, (1862.) *Cacotemnus* Lec., *ibid.* *Anobium*, p. *Muls. and Rey.*, Col. Fr. Térédiles, 62.

The body is long and subcylindrical; the thorax gibbous or tuberculate, excavated beneath for the reception of the head, hind angles not obvious, except in *H. foveatus*. Elytra with regular punctured stria. Antennæ varying according to the division; in the second, 11-jointed, with the intermediate joints well defined, and the last three not very much longer than the preceding united; in the first division (*Cacotemnus*) 10-jointed, the last three joints much longer than the joints 1-7 united.

Prosternum subtruncate behind, separating the anterior coxæ, which are prominent and flattened in front; mesosternum concave, truncate behind, 1865.]

separating the middle coxæ, and leaving a cavity for the reception of the last joints of the antennæ. Metasternum channelled behind; hind coxæ separated, plates very slightly dilated behind, first equal to the second, except in *H. foveatus*. Ventral segments not connate. Legs moderate, thighs not at all clavate, tibiæ slender, tarsi not shorter than the tibiæ, narrow, first and second joints elongated, fifth rather broad, claws small, not toothed.

Our species may be grouped as follows:

- A. Antennæ 10-jointed; hind angles of thorax rounded;  
 Disc of thorax slightly gibbous and compressed behind;  
 Sides sinuous near the front angles..... 1. *errans*.  
 Sides regularly rounded in front..... 2. *carinatus*.  
 Disc of thorax strongly gibbous;  
 Sides of thorax subparallel ..... 3. *linearis*.  
 B. Antennæ 11-jointed; hind angles of thorax rounded;  
 (thorax strongly gibbous);  
 Sides of thorax nearly straight..... 4. *pumilus*.  
 Sides of thorax constricted in front..... 5. *gibicollis*.  
 C. Antennæ 11-jointed; hind angles of thorax distinct..... 6. *foveatus*.

A. *Antennæ 10-jointed*; (*CAOCTEMNUS* Lec.)

1. *H. errans*. *Anobium errans* Mels., Proc. Acad. Nat. Sci., ii. 309.

Middle States and Lake Superior. The disc of the thorax is but slightly gibbous behind; the base and sides are rounded, so that the hind angles are not apparent: the sides converge in front, and are impressed so as to become sinuous near the anterior angles, which are distinct.

2. *H. carinatus*. *Anobium car.* Say, Journ. Acad. Nat. Sci. Phila., ii. 187; ed. Lec, ii. 120.

A very large specimen from Pennsylvania (.26 unc.) has the thorax rather broader, with the sides more rounded and less impressed at the anterior angles than in *H. errans*.

3. *H. linearis*, valde elongatus, fuscus, sericeo-pubescent, thorace latitudine haud brevior, lateribus antice fere parallelis, angulis posticis haud conspicuis, anticis subrectis, disco scabro, postice alte elevato, antice obsolete canaliculato, elytris striis profunde punctatis, antennis 10-articulatis. Long. .20.

One male specimen from Hudson Bay Territory, about the Saskatchewan region. The sides of the thorax are very broadly impressed near the anterior angles, and are nearly parallel for more than two-thirds the length, and are serrate as in *H. errans*. The disc is considerably elevated in front of the base, the elevation becoming gradually broader and indistinct in front, a feeble dorsal impressed line can be observed, which is more obvious upon the elevated portion; there is also a very feeble lateral accessory tubercle. The elytra are parallel, and the tip is obtusely rounded. The joints four to seven of the antennæ are equal and about as long as their width; the eighth is as long as the five preceding united, and about twice as long as its width; the ninth and tenth are each a little longer than the eighth joint.

B. *Antennæ 11-jointed*; (*HEMIOGCLUS* Lec.)

4. *H. pumilus*, valde elongatus, castaneo-rufus, sericeo-pubescent, thorace subtiliter punctato latitudine haud brevior, antrorum paulo angustato, lateribus fere rectis angulis posticis rotundatis, anticis subrectis, dorso postice alte elevato, et gibboso, medio breviter canaliculato, dein carinato, ad basin et versus latera late impresso, elytris punctis quadratis striatis positis, interstitiis planis; antennis 11-articulatis. Long. .11--.14.

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Two specimens, Monmouth Co., New Jersey; collected in the sweeping net. Easily distinguished by the small size and 11-jointed antennæ.

The sides of the thorax converge in front and are nearly straight, and strongly margined; the anterior angles are subacute, and the hind ones are rounded; the disc is very acutely elevated in front of the base, and compressed from the top of the elevation to the base; the front declivity of the elevation is channelled; a distinct impression runs obliquely from the base of the elevation to the anterior angles, and the base each side is transversely impressed; the accessory tubercles are thus rendered more obvious than in the preceding species.

The striæ of the elytra are scarcely impressed, the punctures are large and quadrate, and the intervals flat; the tip is obtusely rounded. The joints of the antennæ, fourth to eighth, are small, and nearly equal; the ninth is as long as the six preceding united; the tenth is as long as the ninth, and the eleventh, as usual, a little longer.

5. *H. gibbicollis*. *Anobium gibbicolle* Lec., Proc. Acad. Nat. Sci., 1859, 284.

One specimen from California. The disc of the thorax is still more elevated than in *H. pumilus*, the impressions still deeper; the sides do not converge in front, and are deeply bisinuate; the anterior angles are prominent, but not acute at tip.

C. *Antennæ 11-jointed; hind angles of thorax distinct.*

6. *H. foveatus*. *Anobium foveatum* Kirby, Fauna Bor. Am., iv. 190.

Northern portion of the United States and in Canada. This species differs in several important respects from the others and should very likely be separated as a distinct genus. The hind angles of the thorax are quite distinct, the base, instead of being rounded, is sinuous each side and prolonged at the middle; the sides are straight and parallel; the disc is tuberculate each side, broadly excavated in the middle, and but feebly carinate at base. The first ventral segment is obviously shorter than the second; the tarsi are less slender, more distinctly dilated, and the second joint is scarcely longer than the third.

ANOBIUM Fabr. (emend. Thoms., loc. cit., 1859)

*Synonym.* *Cœlostethus* Lec., Class. Col. N. America, 204.

The name *Anobium* has been restricted by Thomson to those species in which the thorax is excavated beneath for the reception of the head, and the pectoral excavation for the reception of the antennæ prolonged into the metasternum. As he was the first author who has divided the species composing the old genus upon structural characters, it is proper that his right to select that genus for which the name is to be retained should be recognised. The modern idea of types for genera cannot be rigorously applied to those founded by the older authors, and the attempt to do so has been productive of much confusion. The author who first distinguishes the composite elements of a genus to which no type is definitely assigned by the founder may certainly use his judgement in applying the original name to any one of the new genera which contains species of the original author. This judgment once exercised constitutes a kind of priority, which must be respected, in order to prevent the inconvenience of applying the old name to several different genera, according to the ideas of subsequent commentators. Our species are but two in number.

1. *A. quadrulum* Lec., Proc. Acad. Nat. Sci., 1859, 87.  
Puget Sound.

2. *A. notatum* Say, Journ. Acad. Nat. Sci., v. 172; (ed. Le Conte, ii. 281.)  
Middle and Northern States.

1865.]

## TRYPOPITYS Redt.

In this genus the thorax is deeply excavated beneath for the reception of the head, and the pectoral excavation is prolonged into the metasternum, as in *Anobium*, but the antennæ are serrate, with the second joint shorter than the third; the third to the seventh are triangular, and gradually a little longer; the eighth to the tenth become gradually less triangular, they are nearly equal in length, and each is a little longer than the seventh; the eleventh is still longer, and somewhat pointed. The first ventral segment is bounded behind by a distinct suture, but the other sutures are obliterated. The last joint of the labial palpi is triangular, and broadly truncate.

Our two species may be distinguished thus:

Punctures of elytral striæ large, quadrate..... *sericeus*.  
 Punctures of elytral striæ smaller, oblong..... *punctatus*.

1. *T. sericeus* Lec., Say's Ent. Writings, ii. 280. *Xylatinus sericeus* Say, Journ. Acad. Nat. Sci., v. 172, (ed. Lec., l. c., sup.)  
 Atlantic States; generally diffused.
2. *T. punctatus* Lec., Col. Kansas, (Smithsonian Contr.,) p. 13.  
 New Mexico, near Santa Fe.

## PETALIUM Lec., Class. Col. N. Am., 204, (1862.)

Body elongate, prothorax closely united with the trunk, excavated beneath for the reception of the head, which is small and convex, both above and beneath. The eyes are large and not very convex; the antennæ are half as long as the body; the first joint is long and moderately thick, the second joint is nearly as wide as the first, and about as long as its width; the third and fifth are transverse and triangular; the fourth, sixth and seventh are narrowed and smaller, the eighth is still smaller, and only visible with a very high power; the ninth is triangular, and as long as the third and eighth inclusive; the tenth is similar, and equal to the ninth; the eleventh is a little longer, oval and somewhat pointed. The last joint of the palpi is fusiform and acute.

The prosternum is extremely short, the anterior coxæ are conical, and rise perpendicularly, leaving a wide intervening cavity. The mesosternum is deeply excavated longitudinally, and is overshadowed by the metasternum so as to be visible only on dissection. The metasternum is long, deeply sulcate at posterior half, prolonged in front into a very large, slightly convex lobe, which extends over the mouth in repose; towards the sides the anterior portion of the sternum is declivous, and hollowed transversely for the reception of the middle feet; there is a deep transverse excavation for the reception of the middle tarsi each side of the metasternal lobe. The first ventral segment is short, not excavated for the reception of the hind feet; the second segment is as long as the three following united. The feet are moderate, thighs rather long, tibiæ slender, tarsi short, stout, moderately dilated. The epipleuræ are hollowed out below the humeri for the reception of the middle knees, and foveate about the middle for the hind knees.

I have been thus particular in the description of this singular genus, on account of the difficulty of placing it properly in the system. By the approximation of the metasternum to the head, and the reception of the middle feet in excavations, it is related to *Dorcatoma*, but the form of the body, the structure of the antennæ and head are those of *Anobium*. The head, although protected in part by the prolonged metasternum, does not touch it in any position.

By the epipleuræ foveate for the reception of the hind knees, this genus resembles *Theca*.

But one species is known to me.

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1. *P. bistriatum* Lec., Class. Col. 205. *Anobium bistr.* Say, Journ. Acad. Nat. Sc., v. 172; (ed. Leconte, ii. 281.)

Not uncommon throughout the Middle, Southern and Western States. Easily recognized by its very small size, elongate form, by the two striae of the elytra next the margin being deep, while the others are merely rows of punctures, becoming obsolete behind. The color is usually nearly black, with the feet yellow.

#### THECA Muls. & Rey.

Body oval, moderately elongated, narrowed in front, convex; head convex beneath, *not at all* excavated for reception of the antennæ; when deflexed, received in a very deep excavation of the under surface of the prothorax, which is nearly closed behind; antennæ 11-jointed, rather short, received under the head, in the prothoracic excavation. First joint large auriculate, second slender, oblong, 3—6 small, seventh acutely prolonged inwards, eighth also prolonged inwards, short, but nearly as wide as the ninth, the 9—10 large, dilated, triangular, eleventh somewhat longer, oval; the last three united, longer than the preceding joints; palpi with the last joint securiform. Prosternum not visible, except on dissection, short, declivous; front coxæ nearly contiguous, horizontal; mesosternum compressed and elevated in the form of a spear head, between and in front of the middle and anterior coxæ, extending to the prothoracic cavity; middle coxæ not widely separated, legs received in deep excavations of the meso- and meta-thorax. Metasternum rather short, deeply channelled, declivous in front and excavated for reception of middle legs, narrowly truncate at the middle. First ventral segment excavated for reception of hind legs. Legs rather feeble, tibiæ slightly compressed, tarsi short, the first joint somewhat elongated. Elytra with all the striae deeply impressed, epipleuræ foveate at the middle for reception of hind knees.

The position of this genus is somewhat doubtful. The antennæ do not lie in repose between the coxæ, that space being occupied by the elevated mesosternum. The head, however, is not excavated beneath for the reception of the antennæ, and the head is also prevented from reaching the metasternum by the interposition of this piece. The form of the body suggests rather an affinity with *Anobium* than with *Dorcato*, or *Xyletinus*, and I, therefore, regard it as an aberrant member of the present group, in which we have had already (*Petalium*) an instance of anomalous and excessive development of the metasternum, simulating the form observed in the genera allied to *Dorcato*.

1. *Th. profunda*, elongato-ovalis, convexa, antice attenuata, nigro picea, griseo-pubescentia, capite punctulato, thorace lateribus obliquis rectis, rubeo haud dense punctato, elytris striis æqualiter profundis, in fundo punctatis, interstitiis planis vix punctulatis; abdomine punctulato, metasterno rubeo punctato. Long. .085—10.

One specimen from Pennsylvania, and another from Lake Superior.

#### EUPACTUS Lec.

Body elongate, oval, very convex, smooth, shining, glabrous, head with two deep frontal lines before the eyes, and a deep transverse suture separating a small flat clypeus. Eyes large, moderately convex, entire, tolerably finely granulated. Antennæ 11-jointed; first joint large, curved; second joint as wide as, but much shorter, than the first, and suddenly curved inwards; third joint much narrower, triangular, 4—8 as wide as the third, short, transverse; ninth large, compressed, triangular, but not prolonged inwards, about twice as long as its width, and equal in length to the joints 2—8 united; tenth triangular, as wide as the ninth, truncate at tip, closely applied to the eleventh, which is obtusely rounded at the extremity; the tenth and eleventh together 1865.]

form a mass a little longer than the ninth joint. Palpi with the last joint oval, truncate (?). Head convex beneath, with a deep, nearly semicircular excavation behind the mentum; the bottom of this excavation is smooth, but opaque; mentum large, trapezoidal. Mandibles strongly dilated at the base. Prothorax narrowed in front, and rounded at the apex, deeply excavated beneath for reception of head. Prosternum short, concave, declivous, widely separating the anterior coxæ, which rise to the level of the metasternum, and are dilated into a transverse, horizontal plate. Mesosternum invisible, (probably concave, and nearly perpendicular.) Metasternum tolerably large, not channelled; produced in front between the middle coxæ into a short and deeply emarginated lobe, which receives the end of the antennæ; declivous each side at the anterior part, and deeply excavated for the reception of the middle feet, excavation distinctly limited by an elevated line; side pieces very narrow, nearly concealed by the elytra. Plates of hind coxæ gradually widened externally. First ventral segment deeply excavated for reception of hind feet; segments 2—4 gradually diminishing in length, the third and fourth sutures double, (that is, composed of two approximate lines.) Legs slender, tibiae not dilated, tarsi robust, first joint scarcely longer. Elytra uniformly sparsely punctured, entirely destitute of striæ or rows of punctures.

This singular genus is remarkable for the form of the antennæ. The dilatation of the anterior coxæ shows a relation to *Theca*, while the manner in which the antennæ are folded between the coxæ, in a sternal excavation recalls the more typical *Anobia*. In the arrangement of the sternal pieces, and close contractility of the feet some resemblance to *Chelonarium* can also be observed. It resembles very much the figure of *Mesocolopus niger*, *Duvai*, but in that genus the antennæ are serrate.

1. *Eu. nitidus*, elongato-ovalis, convexus, niger nitidus, glaber, supra parce subtiliter punctatus, abdomine punctato, metasterno parce fortius punctato, antennis piceis, tibiis tarsisque dilutioribus. Long. .09—.12.

Western States, Kentucky, (Mr. Wild,) Illinois, (Mr. Walsh.) I have also a specimen marked as collected by Mr. Xantus, at Cape San Lucas, but I regard the locality as doubtful. The surface above is sparsely and finely punctured, the punctures at the middle of the thorax and hinder part of the elytra being less distinct; the thorax is a little wider than its length, narrowed in front, rounded at the apex, feebly bisinuate at base, transversely very convex, sides not margined, the true margin being very much inflexed. Elytra destitute of striæ, suture feebly elevated. Beneath the abdomen is tolerably densely punctured, the third and fourth ventral sutures composed of two approximate lines; the metasternum sparsely but strongly punctured, middle and front feet densely punctulate; inflexed sides prothorax densely punctured.

2. *Eu. punctulatus*, ovalis valde convexus, niger nitidus, glaber subtiliter parce punctulatus, elytris prope basin intra humeros oblique impressis. Long. .12.

One specimen from Louisiana, in Mr. Ulke's collection. Differs from *Eu. nitidus* by the broader form, and much more finely punctured elytra: the basal impression is quite distinct, and is just inside of the humeral elevation. No trace of a similar impression is visible in the five specimens of the preceding species now before me.

3. *Eu. pudicus*, subcylindricus, piceus opacus, alutaceus, dense subtiliter sericeo-pubescentis, obsolete haud dense punctulatus, antennis rufo-piceis, articulis duobus ultimis arcte applicatis, præcedente conjunctis longiore. Long. .19.

? *Anobium pudicum* Boheman, Eugen. Resa, 86.

One specimen from Lower California, given me by Mr. Ulke. Very different in form and appearance from *Eu. nitidus*, but without any marked generic distinction. The form is a little more robust than *Ernobius* mol-

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lis; the lustre is somewhat leaden, owing to the very fine and dense sericeous pubescence with which it is clothed. The 9th joint of the antennæ is flat, nearly oblong, and more than twice as long as its width; the 10th is triangular, and narrowed at the base; closely joined to the 11th, which is not longer than its width, shorter than the 10th, and rounded at tip; the 10th and 11th together are shorter than the 9th.

The antennæ are described by Boheman as having but two elongated terminal joints; unless the student would consider such a form impossible in this type, the union between the 10th and 11th joints might be readily overlooked, and the antennæ thus erroneously described.

**SUBGROUP III. XYLETINI.**

The species of this subgroup are generally oval in form, rarely subelongate, and, except in some species of *Xyletinus*, have the contractile power considerably developed. The head, when inflexed, extends beyond the excavated under surface of the prothorax, over the mesosternum, so that the mandibles attain the metasternum, and in most the genera lie in close apposition with its anterior margin. The head is deeply excavated each side in the gular region for the reception of the antennæ, which in repose are curved into these cavities, and do not lie between the coxæ. The front coxæ are contiguous and depressed; the middle feet are frequently received in excavations of the meso- and metasternum, and the knees rest in a subhumeral cavity of the epipleuræ. The first ventral segment is sometimes excavated for the reception of the hind legs, sometimes not; the epipleuræ are foveate for the hind knees in *Protheca*. The metasternum is never prolonged and lobed in front of the middle coxæ, as in the next subgroup, but is broadly truncate, on a line with the coxæ, when the latter are widely separated. The mandibles are always broadly dilated at the base. The antennæ are variable in shape, being sometimes serrate or subpectinate, and sometimes having the last three joints dilated, forming a long, loose club.

The European genera *Mesothos* and *Mesocæloptus*, with the first ventral segment excavated for reception of the hind feet, the antennæ serrate, and the front coxæ contiguous, probably belong to this subgroup.

Elytra striate, antennæ serrate..... *Xyletinus*.

Elytra not striate; first ventral segment not excavated:

Antennæ serrate..... *Lasioderma*.

Antennæ with the last three joints large..... ? *Catorama*.

First ventral segment excavated:

Epipleuræ not foveate at the middle..... *Hemiptychus*.

Epipleuræ foveate at the middle..... *Protheca*.

**XYLETINUS Latr.**

Our species differ notably in form; in the first the body is cylindrical, and the head but feebly excavated beneath for the reception of the antennæ; in the others (typical *Xyletinus*) the head deeply excavated each side beneath. The metasternum is declivous in front, but the declivous portion is not sharply defined by a transverse line, as in the two following genera.

1. *X. peltatus*. *Anobium peltatum* Harris, Trans. Hartf. Nat. Hist. Soc., 75. Throughout the Atlantic States, not common.

2. *X. mucoreus*, cylindricus, piceus opacus, alutacens, dense sericeo-pubescentis, thorace punctulato convexo, latitudine duplo brevioris, lateribus obliquis paulo rotundatis, angulis posticis valde obtusis rotundatis, elytris striis subtilibus punctatis, interstitiis planis parce subtiliter punctulatis; palpis antennisque ferrugineis, his articulo primo piceo. Long. .26.

One specimen from Louisiana in the collection of Mr. Ulke. Resembles 1865.]

somewhat *X. peltatus*, but is very much larger, and rather stouter, and the head is more excavated beneath.

3. *X. fucatus*, elongato-ovalis, convexus, niger, subtiliter pubescens, capite thoraceque subtiliter reticulato-punctatis, hoc latitudine triplo brevior, lateribus valde rotundatis, antice late explanatis, margine obscure ferrugineo, dorso modice convexo, ad basin linea brevi lævi subelevata, elytris striis profundis impunctatis, interstitiis planis, alutaceis; antennis pedibusque ferrugineis, illis articulo imo nigricante. Long. .18.

Eagle Harbor, Lake Superior; three specimens.

4. *X. pallidus*, dilute piceo-ferrugineus, elongatus, pallide sericeo-pubescent, capite thoraceque dense punctulatis, hoc brevi, lateribus late rotundatis, angulis omnibus apice rotundatis, disco convexo, linea dorsali pone medium lævi subelevata, elytris dense rugose punctulatis, striis parum impressis punctatis; antennarum articulo 2do triangulari, sequentibus vix minore. Long. .12.

A single specimen collected at Cape San Lucas, Lower California, by Mr. Xántus. The antennæ (male) are but little shorter than the body, the joints are broad and triangular, the second being scarcely smaller than the third; the eyes are very large and prominent. This species resembles *X. peltatus* more than the preceding, but differs from both by the punctured and scarcely impressed striæ of the elytra.

#### LASIODERMA Stephens, Illust. 5, 417.

Syn. *Pseudochina*, subg. *Hypora* Muls. & Rey, Col. Fr. Térédiles, 294.

The metasternum is declivous in front, with the declivous portion sharply defined by a transverse elevated line, extending entirely across the trunk.

1. *L. serricornæ*. *Ptinus serric.* Fabr. Ent. Syst., i. 241; Syst. El. *Pseudochina (Hypora) serric.* Muls. & Rey, Térédiles, 307. *Ptilinus testaceus* Duftschm. *Xyletinus testaceus* Sturm., &c. *Lasioderma testaceum* Stephens, Ill. v. 417.

Carried by commerce over the whole globe; lives chiefly, though not exclusively, upon tobacco; I have found it, also, in the powder of capsicum.

Mr. Chevrolat, (Ann. Ent. Soc. Fr., 1861, 390,) refers this species to *Catorama*, but subsequently has corrected the error; he considers *Pt. testaceus* Duftschm., as a different species. *Xyletinus pallidus* Lap., Hist. Nat., iv. 295, is also cited by him as a synonym, but I have had no opportunity of verifying it; I accept it with hesitation, as *Ptilinus pallens* Germ., Ins. Nov. 79, a species with striate elytra, is also quoted under the same name (*pallidus*.)

2. *L. dermestinum*, elongato-ovale, convexum, nigro-piceum, subtiliter griseo-sericeo pubescens, subtilissime alutaceum, thorace latitudine hand brevior, antrorsum subangustato, apice valde rotundato, basi truncato, angulis anticis valde deflexis rectis, posticis obtusis subrotundatis, elytris thoracæ plus duplo longioribus; antennis pedibusque testaceis. Long. .11—13.

Cape San Lucas; collected by Mr. Xántus, and given me by Mr. H. Ulke. In the two specimens before me, I can merely see that the antennæ are reddish yellow, without distinguishing particularly the relation of the joints to each other. This species resembles in form a small *Attagenus*, and is much less stout than *L. serricornæ*.

#### ? CATORAMA Guér.

The species which I have referred to this genus differs from *C. tabei*, the type described by Guérin (Rev. et Mag. Zool. 1850, 431,) by the last joint of the palpi being truncate, but not emarginate. There is, however, not a complete uniformity in the different species of *Xyletinus* in this respect, and I have, there-

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fore, preferred placing the insect in question in the present genus, to multiplying unnecessarily the divisions already proposed.

The body is oval and convex, very similar to *Hemiptychus*, but the first ventral segment is not excavated for the reception of the hind feet. The metasternum is declivous in front, with the declivous part limited by a transverse line, precisely as in *Lasioderma serricorne*, (which it resembles in appearance, though larger), except that the line becomes obsolete towards the sides. The anterior and middle coxæ are contiguous, as in the species just named. The antennæ are 11-jointed, with the first joint curved and moderately dilated, the second longer and thicker than the third; 3—8 equal in thickness, the third longer, the others about as long as their width; ninth and tenth large, compressed, triangular, ninth as long as the five preceding united, tenth a little longer, eleventh as long as the tenth, and a little narrower, oval, rounded at the tip. The head beneath is as deeply excavated as in *L. serricorne*; the front is obtusely impressed in the same manner. The tibiæ are compressed, with two elevated lines externally; the tarsi are dilated, with the first joint moderately elongated, the second equal to the third, and the fifth clavated and depressed. The eyes are uniformly convex, moderately granulated, as in *Lasioderma*, and not at all emarginate.

1. *C. simplex*, longius ovale, convexum, nigro-fuscum, pube helva sericeo-pubescentis, opacum alutaceum, punctulatum; thorace medio dense, lateribus parce punctato, brevi antice subtruncato, basi cum lateribus rotundatis, angulis posticis nullis, anticis impressis valde deflexis, (lateraliter visis acutis,) elytris thorace triplo longioribus, haud punctatis; antennis pedibusque testaceis. Long. .14—.18.

Two specimens, collected in Kentucky, by Mr. J. H. Wild.

HEMIPTYCHUS Lec.

Synonym. *Dorcatoma Lec.*, Class. Col., 204.

This new genus completes the passage from the preceding genera to *Dorcatoma*, from which it differs by the anterior coxæ being contiguous, as in *Lasioderma*; by the prosternum being short, and not prolonged into two processes behind; the mesosternum being flat, perpendicular and triangular, and the metasternum without medial channel, not produced in front, but straight, with a very small protuberance at the middle between the middle coxæ. The eyes are coarsely granulated, not uniformly convex as in *Catorama*, but compressed longitudinally at the side, and very feebly emarginated in front. The antennæ are 10-jointed, the first joint large auriculate, second much smaller, somewhat dilated, 3—7 narrow, very small, closely united, eighth triangular, as long as the six preceding united, ninth a little narrower than the eighth, tenth oval, longer than the ninth, and rounded at the tip. Palpi with the last joint dilated, truncate. Feet robust, tibiæ compressed, with a deep, longitudinal furrow on the outer surface, tarsi stout. First joint as long as the two following united. First ventral segment excavated for reception of hind feet. Elytra with two submarginal striæ, extending from the middle to the tip.\*

Our species may be distinguished as follows:

- Elytral striæ faintly visible at base; pubescence coarse:
  - Body elongate, elytra densely punctured.... 1. *punctatus*.
  - Body oval, elytra sparsely punctured.....2. *gravis*.
  - Body almost rounded, elytra sparsely punctured.....3. *pusillus*.
- Elytral striæ not prolonged in front; pubescence fine:
  - Surface very finely and densely punctulate:
    - Striæ fine, body broadly oval.....4. *borealis*.
    - Striæ deep, body elongate oval.....5. *ventralis*.

\* *Dorcatoma externa* *Muls. & Rey, Trévidles*, 367, probably belongs to this genus.

Striæ very fine and short, body oval.....6. *obsoletus*.  
 Surface sparsely and finely punctulate, body elongate oval,  
 striæ deep.....7. *nigritulus*.

1. *H. punctatus*, elongato-ovalis, subcylindricus, piceus, dense minus subtiliter helvo-pubescent, subtilissime punctulatus, elytris præcipue versus latera punctatis et rugosis, striis duabus externis a medio ad apicem profundis, antice oblitteratis, externa ad humerum paulo impressa; antennis flavo-testaceis. Long. .11.

Two specimens, one from Louisiana, the other from Georgia. The species of this genus agree so nearly in most of the characters, that it is only desirable to mention the distinctive marks under each species. This one is narrower than the other coarsely pubescent species, and the elytra are twice as long as their width, and decidedly more punctured, especially at the sides; the two external striæ are deep, and extend from the middle to the tip, before the middle they are obliterated, but at the base the outer one again becomes visible; there are faint traces of striæ near the sides and tip.

2. *H. gravis*, ovalis, piceus, dense minus subtiliter helvo-pubescent, subtilissime punctulatus, elytris parce punctatis, striis duabus externis a medio ad apicem profundis, antice oblitteratis, externa ad basin paulo impressa, antennis flavo-testaceis. Long. .12—15.

*Dorcatoma grave* Lec., Proc. Acad. Nat. Sc. Phila., 1858, 72.

Pennsylvania, Dr. Melsheimer; Texas. More regularly oval than the preceding, with the elytra only sparsely punctured. There are some faint traces of striæ inside of the two outer ones, which are deep from the tip to the middle and then obliterated; the outer one is visible near the base.

Two smaller specimens (.10 unc.) collected in Illinois, by Mr. B. D. Walsh, differ by the elytra being more finely punctulate, and more sparsely but distinctly punctured; I do not regard them as indicating a distinct species.

3. *H. pusillus*, rotundato-ovalis, convexus, rufo-piceus, dense minus subtiliter helvo-pubescent, elytris parce punctulatis, striis duabus externis antice oblitteratis, antennis flavo-testaceis. Long. .08.

*Dorcatoma pusillum* Lec., Proc. Acad. Nat. Sc. Phila., 1858, 72.

Found at Fort Yuma, (junction of Colorado and Gila), California. The smaller size and more rounded form readily distinguish this species. The surface appears nearly smooth, with scattered very fine punctures on the elytra, almost concealed by the pubescence.

4. *H. borealis*, rotundato-ovalis, convexus piceus, subtiliter griseo-pubescent, vix conspicue punctulatus, elytris striis externis duabus ad medium antice abbreviatis, capite rufescente, antennis testaceis. Long. .12.

One specimen, Lake Superior. The thorax is somewhat more compressed at the sides, so that the outline is straight, and the body becomes more acuminate in front, than in the preceding species. The surface is scarcely visibly punctulate, and there are no scattered punctures on the elytra; the striæ are finely, but well impressed, and are absolutely abbreviated, not obliterated in front as in the preceding three species, and without any traces of prolongation near the base.

5. *H. ventralis*, elongato-ovalis, niger nitidus, subtiliter griseo-pubescent, subtilissime punctulatus, elytris striis duabus externis profundis, ad medium antice abbreviatis, capite abdomine pedibusque obscure rufo-piceis, antennis flavo-testaceis. Long. .07—09.

Illinois, Mr. B. D. Walsh. The elongate oval body, equally rounded at each end, and not at all acuminate in front, will readily distinguish this species. The pubescence is very fine, and there are very fine scattered punctures on the elytra.

6. *H. obsoletus*, ovalis, convexus, niger nitidus, subtiliter griseo-pubes-

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cens, vix subtilissime punctulatus, elytris parce subtiliter punctulatis, striis externis duabus subtilibus, pone medium antice abbreviatis, antennis testaceis. Long. .10.

One specimen collected at Cape San Lucas, Lower California, by Mr. John Xantus, and given me by Mr. Ulke. This species has also a regularly oval form, equally rounded at each end, but is broader than *H. nigrifulus*, with the striæ of the elytra finer and shorter, extending scarcely more than one-third of their length.

7. *H. nigrifulus*, elongato-ovalis, niger nitidus, subtiliter griseo-pubes-cens, minus dense subtiliter punctulatus, elytris striis duabus externis profun-dis pone medium antice abbreviatis, antennis tarsisque testaceis. Long. .09.

One specimen, Pennsylvania. Of the same form and size as *H. ventralis*, but distinguished by the body being entirely black, with the upper surface less finely and not densely punctulate.

PROTHECA Lec.

The two species constituting this genus are small, short, cylindrical insects, having more the appearance of minute *Hylesinus* than of any genera of this group. The head is deeply excavated beneath, with a medial gular pro-minance, as in *Lasioderma serricornis*, near which the antennæ are curved in a state of repose. The eyes are entire, slightly convex, and moderately finely granulated. Palpi with the last joint triangular, broadly truncate. Antennæ with the first joint long and thick, slightly curved, but scarcely articu-late; second joint rounded, thicker than the following; 3—8 small, triangular, the third, fifth and seventh being broader than the others; ninth and tenth subtriangular, one-half longer than wide; eleventh longer, oval, the three to-gether as long as the preceding joints united. Prothorax convex, transverse, gradually narrowed in front, with the sides nearly straight, hind angles rounded, front angles very much deflexed; prosternum very short, acute behind; front coxæ almost contiguous, conical, depressed; mesosternum perpendicular, slightly concave in the middle; metasternum deeply channelled, declivous in front each side, somewhat prominent and deeply foveate between the middle coxæ, declivous portion scarcely excavated for reception of middle feet, but defined posteriorly by a transverse line, extending to the medial furrow. First ventral segment excavated for reception of hind feet, and almost entirely con-cealed by them. Feet slender, tibiæ not compressed, tarsi moderate. First joint slightly elongated; front tarsi visible in repose, folded over the tip of the mandibles, and along the anterior margin of the metasternum. Epipleuræ ex-cavated beneath the humeri for the reception of the middle knees, sinuate at the margin, and foveate for the reception of the hind knees (as in *Petalium* and *Theca*); striæ composed of punctures, scarcely impressed, even at the sides.

Our two species may be distinguished as follows:

Striæ of elytra not obsolete behind..... *puberula*.  
 Striæ of elytra obliterated behind..... *hispidæ*.

1. *P. puberula*, ovalis, subcylindrica, picea, pubesces, thorace subtiliter dense punctulato, elytris nitidis, seriebus punctorum postice haud obliterated, interstitiis rugosis, antennis flavis. Long. .08.

Pennsylvania, three specimens; Georgia, one specimen. The pubescence of the elytra is arranged in lines, the hairs are not rigid, and the rugosities of the intervals are quite obvious; the striæ are composed of punctures, which are large at the base, and become small towards the tip.

2. *P. hispidæ*, ovalis, nigro-picea, opaca, pube rigida cinerea induta, tho-race punctulato, elytris seriebus punctorum subtilibus pone medium oblitera-tis, interstitiis alutaceis, parce punctulatis, antennis flavis. Long. .08.

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Georgia, several specimens. Shorter and more robust than the preceding, and easily distinguished by the difference in sculpture.

SUBGROUP IV. *DORCATOMATA*.

The body is oval convex, or even globose, capable of being closely contracted. The head when deflexed is received into a deep cavity of the prothorax, and the mandibles abut against the anterior margin of the metasternum, which is prolonged between the middle coxæ into a short, broad lobe, nearly truncate in front. The antennæ are received in a sternal cavity between the front coxæ, and in the mesosternum, which is deeply buried under the metasternum. The first joint is large and auriculate, and the last three joints dilated and very large, forming a loose club much longer than the preceding portion. The prosternum is very short and broad, and separates widely the front coxæ, which are small, conical and ascend perpendicularly along the sides of the cavity. The middle legs are received in deep excavations of the meso- and metasternum, the tarsi resting in small, deep grooves behind the metasternal lobe, and the knees in subhumeral cavities of the epipleuræ. The first ventral segment is deeply excavated each side for the reception of the hind legs; the knees are not received in epipleural foveæ. The ventral segments seem disposed to become connate.

Our genera are but two, distinguished as follows:

Prosternum produced behind into two long horns. *Dorcatoma*.  
Prosternum broadly truncate behind..... *Cœnocara*.

*DORCATOMA* Herbst, (emend. Thomson, Skand. Col. i. 90.)

This genus, as restricted by Thomson, and subsequently by Mulsant and Rey, contains species of oval form, having the eyes slightly emarginated and rather finely granulated. The head is not excavated beneath, but only impressed, and the antennæ are received upon the breast, between the anterior coxæ. Antennæ 10-jointed; first joint large, auriculate, second much smaller, dilated; 3—7 narrow, very small; eighth triangular, as long as the six preceding united; ninth triangular, as broad as the eighth in the males, but in the females a little narrower; tenth, oval, about one-third longer than the ninth, more or less curved, rounded at tip. Palpi with the last joint securiform. Prosternum (visible only on dissection) broad, short, concave, produced behind into two slender and divergent horns, which fit into excavations of the mesosternum; anterior coxæ small, perpendicular, widely distant. Mesosternum deeply excavated, concealed under the metasternum, which is produced between the middle coxæ, and truncate in front; medial channel well marked. Feet moderate, tibiæ slender, tarsi moderate, first joint somewhat longer. First ventral segment excavated for the reception of hind feet. Elytra generally with two entire marginal striæ, and a short one near the humerus, more or less visible, sometimes with striæ abbreviated near the base. The punctures in our species are arranged so as to leave intervening, narrow, smooth vittæ; the epipleuræ are not at all foveate for the reception of the knees of the hind feet.

Our two species may be readily distinguished by the sculpture of the elytra.

Elytra sparsely punctulate in rows, striæ entire..... *setulosum*.  
Elytra densely punctulate in bands, striæ abbreviated in front..... *incomptum*.

1. *D. setulosum*, ovale convexum nigrum nitidum, pube brevi erecta fusca vestitum, thorace subtiliter punctulato, elytris subseriatim haud dense punctulatis, seriebus fere per paria approximatis, striis duabus externis profundis, 3ia brevi antennis pedibusque piceo-testaceis. Long. .09.

Lake Superior, Pennsylvania, Georgia, also in North Carolina, (Dr. Zimmermann.) The punctures of the elytra are fine, not densely placed, arranged almost in regular rows, which are approximated by pairs; the pubescence is

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brown, rigid and erect; the two outer striæ are deep, the third is short at the base, but continued by punctures of large size almost to the middle. The abdomen is finely and densely punctured, the segments apparently connate, the metasternum coarsely and irregularly punctured.

2. *D. incomp tum*, ovale convexum, nigrum nitidum, pube longiore fusca vestitum, thorace punctulato, capite abdomineque rufescentibus, elytris dense punctulatis, vittis angustis impunctatis ornatis, pilis bifariam positis, striis duabus externis profundis, antice paulo abbreviatis; antennis testaceis, pedibus piceis. Long. .09.

South Carolina (Dr. Zimmermann,) and Pennsylvania; two specimens. The punctures of the elytra are very fine and close set, arranged in bands, with intervening, narrow, smooth bands; the pubescence is brown, and the hairs lie some longitudinally, some obliquely directed outwards; the striæ are deep, do not extend to the base, but are abbreviated about the anterior fourth; no vestige of a short humeral striæ is seen. The abdomen is finely, the metasternum more coarsely and less densely, but equally punctured.

CEENOCHARA Thoms., Skand. Col. i. 90, (1859.)

Synonyms. *Tylistus Lec.*, Class. Col. 203, (1862.) *Enneatoma Muls. & Rey*, Col. Fr. Térédiles, 367, (1863.)

In this genus the body is broadly ovate, nearly globose; the eyes are deeply emarginate, and nearly divided by an impression. The antennæ are 9-jointed; first joint long, auriculate, second small, rather broader than its length; 3—6 very small, indistinct; seventh large, transverse triangular, very much produced inwards in the male; eighth elongate, subtriangular, as long as the transverse diameter of the preceding joint, ninth longer than the eighth, elongate oval, somewhat curved, very small at point of attachment to preceding joint. Palpi with the last joint triangular, truncate; head transversely vaguely excavated beneath. Prosternum very short, concave, broadly truncate behind, widely separating the anterior coxæ; mesosternum entirely concealed under metasternum, deeply concave. Metasternum large, not channelled; produced between the middle coxæ, and widely truncate in front. First ventral segment excavated for reception of hind feet. Feet slender, tibiæ not compressed, tarsi moderate. First joint longer than the two following united. Elytra with three striæ towards the sides, the two outer ones entire, the inner one extending from the humerus to near the middle.

The larvæ live in species of *Lycoperdon* (puff balls,) and before being transformed construct small, ellipsoidal cells, in which the subsequent changes take place. The perfect insects are found on leaves, chiefly of oak.

The two species in my collection are easily distinguished.

Elytra coarsely punctured, pubescence hispid..... *oculata*.

Elytra finely punctured, pubescence short, prostrate..... *scymnoides*.

To this genus probably belongs *Dorcatoma bicolor Germ.*, Ins. Nov. 79, which is unknown to me. The antennæ, head, thorax and feet are red, the rest of the body black.

1. *C. oculata*. *Dorcatoma oculata* Say, Long's Exped. St. Peters., ii. 273, (♂); (ed. LeConte, i. 180;) *Dorc. simile* Say, Bost. Journ. Nat. Hist., i. 166, (♀); (ed. LeConte, ii. 642;) *Tylistus similis* Lec., Class. Col. N. Amer., 204.

Abundant throughout the Atlantic States, from Lake Superior to Louisiana, and from Maine to Kansas. The punctures of the elytra are coarse and distant, and the pubescence rigid and suberect, some of the hairs directed longitudinally, others obliquely outwards. In the female the seventh joint of the antennæ is almost regularly triangular, and but little produced inwards; the eighth joint is less slender than in the male, and the last joint less arcuated. These differences account for the two specific names given by Say. The striæ are deep, and the inner one extends from the base nearly to the middle.

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2. *C. scymnoides*, rotundata convexa nigra subnitida, confertim subtilius punctata, pube brevi cinerea depressa vestita, striis externis duabus integris, 3ia ante medium postice abbreviata, antennis tibiis tarsisque piceo-testaceis. Long. .10.

One specimen (female) collected in Vermont, by the late Prof. C. B. Adams. The fine, short cinereous pubescence produces a pruinose appearance; the striæ are less deep than in *C. oculata*. The under surface is less coarsely and more densely punctured than in that species. The seventh joint of the antennæ has the form of an equilateral triangle; the eighth is narrower, and subtriangular, the ninth elongate, oval and not curved. The general appearance, dependent on the form and pubescence, is that of a *Scymnus*.

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*November 7th.*

MR. CASSIN, Vice-President, in the Chair.

Twenty-five members present.

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*November 14th.*

The President, DR. BRIDGES, in the Chair.

Thirty-four members present.

The following paper was offered for publication :

"Contributions to the Palæontology of Illinois," &c. By F. B. Meek and A. H. Worthen.

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*November 21st.*

The President, DR. BRIDGES, in the Chair.

Thirty-one members present.

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*November 28th.*

The President, DR. BRIDGES, in the Chair.

Thirty-four members present.

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*December 5th.*

MR. VAUX, Vice-President, in the Chair.

Twenty-nine members present.

The following paper was offered for publication :

"Observations on the microscopic shell structure of the *Spirifer cupidatus*," &c. By F. B. Meek.

*Adjourned Business Meeting from November 28th.*

On report of the Committee the following paper was ordered to be published :

## Contributions to the PALEONTOLOGY of Illinois and other Western States.

BY F. B. MEEK AND A. H. WORTHEN,

(Of the Illinois State Geological Survey.)

## MOLLUSCA.

## LAMELLIBRANCHIATA.

Genus LITHOPHAGA, Bolten, 1798.

(LITHODOMUS, Cuvier, 1817.)

LITHOPHAGA? PERTENUIS, M. &amp; W.

Shell slender, elongated, narrowing anteriorly, extremely thin, moderately convex, in the central and anterior regions, more compressed and uncinate behind; posterior margin narrowly rounded in outline; anterior extremity extremely short and very narrowly rounded; basal margin straight along the middle, and curving up gradually towards the extremities; hinge line straight, not exactly parallel to the base, and apparently about half as long as the shell,—passing imperceptibly into the posterior dorsal margin. Beaks almost terminal, very oblique, and nearly obsolete; umbonal gibbosity slightly raised above the hinge line. Surface smooth, or with only faint traces of fine concentric striae, and very obscure, undefined concentric undulations.

Length, 1.73 inch, height, 0.62 inch; convexity, 0.50 inch.

This species has very nearly the form of the following, but may be distinguished by its smooth surface, which never shows the distinct thread-like concentric striae and regular wrinkles of that shell. As we know nothing of the hinge and interior of these species, we merely place them provisionally in the genus *Lithophaga*, from the similarity of their external characters, to the recent *L. lithophaga*. Possibly their names should be written *Modiolus lingualis* and *M. pertenuis*, or more properly *Volsella lingualis*, and *V. pertenuis*, as they may belong to that genus, and *Modiolus* and *Modiola* are merely synonyms with the older name *Volsella*.

*Locality and position.* Warsaw, Illinois. Warsaw division of the subcarboniferous series.

LITHOPHAGA? LINGUALIS, Phillips (?) sp.

*Modiola lingualis*, Phillips, Geol. Yorkshire, ii, p. 209, pl. v, fig. 2.

The shell we have referred with doubt to Phillips' species cited above, agrees with his figure in so many respects, that we are inclined to believe it probably identical, though it may prove to be distinct on comparison of specimens.\* It is an exceedingly thin shell, and ornamented by moderately strong thread-like concentric striae, which, on the umbonal slopes, sometimes form neat little ridges or undulations, while a few more irregular, distant marks of growth, are seen on other parts of the surface. Some of the specimens are much larger than that figured by Phillips, being nearly three inches in length. The direction of the marks of growth on these larger specimens, show that they were almost exactly like Phillips' figures, when of the same size. They also show that the hinge line is long, straight, and bordered by a slender marginal line within.

*Locality and position.* Warsaw, Illinois. Keokuk division of subcarboniferous series.

\* It is much to be regretted that many of the species figured by Prof. Phillips in his Geology of Yorkshire, have not yet been fully and clearly described.

## Genus MODIOLOPSIS, Hall, 1847.

## MODIOLOPSIS PEROVATA, M. &amp; W.

Shell longitudinally ovate, the widest part being a little behind the middle, compressed, very thin, extremely inequilateral and oblique; posterior side compressed, cuneate, regularly rounded in outline; anterior side very short, more narrowly rounded than the posterior margin. Dorsal outline forming a broad, nearly regular arch from the beaks into the posterior border; base oblique, and somewhat straightened just in front of the middle, and rounding up towards the extremities. Beaks compressed, scarcely projecting beyond the rounded anterior outline, and placed directly over the anterior extremity. Surface marked with regular concentric striæ, and small, irregular furrows. Anterior muscular impression oval, distinct, located close to the margin, under the beak.

Length, 1.92 inches; height, 1.18 inches; convexity, 0.40 inch.

This species has much the general appearance of *Modiolopsis concentrica*, (Hall, Geol. Fourth Dist. p. 196, fig. 9,) but differs in having its anterior outline rounded, instead of protuberant and subangular in outline. Its margin is also more prominent in the antero-ventral region, and without "a longitudinal impression directly below the beaks."

*Locality and position.* White Sulphur Springs, Delaware County, Ohio. Hamilton Group, of Devonian series.

## Genus PLEUROPHORUS, King, 1844.

## PLEUROPHORUS SUBCOSTATUS.

Shell elongate-oblong, moderately convex; umbonal ridges the most convex part of the valves, and extending obliquely from the beaks towards the postero-basal margin; anterior ventral region somewhat compressed; basal and cardinal margins very nearly straight and subparallel, the former being usually somewhat sinuous or arcuate along the middle; extremities rather narrowly rounded, the posterior being generally a little wider than the other, and sometimes faintly subtruncate obliquely. Hinge line long and nearly straight; posterior lateral tooth of each valve elongated parallel to the hinge margin, very remote from the cardinal teeth, and extending back a little beyond the posterior muscular impression. Beaks depressed upon a line with the dorsal margin, small, somewhat compressed, and placed about one-ninth the entire length of the shell behind the anterior margin. Scar of the anterior adductor muscle deep, trigonal-subovate, pointed above, and strongly defined by the prominent vertical ridge just behind it; those of the pedal muscles small, nearly marginal, and located directly over the anterior adductors; posterior adductor scars larger and more shallow than the anterior, subquadrate in outline, and placed close up under the posterior hinge teeth. Pallial impression well defined. Surface of casts showing traces of a few obscure concentric markings, crossed on the postero-dorsal region by traces of about three equal obscure radiating costæ. Exterior surface and cardinal teeth unknown.

Length of a medium sized specimen, (internal cast,) 0.88 inch; height of do., 0.37 inch; convexity, 0.26 inch. Some larger specimens of same proportion, measure 1.33 inches in length.

This species is apparently related to *P. costatus*, of Brown (sp.), some varieties of which, as figured by Prof. King (Monogr. Permian Fossils, England, pl. xv,) it closely resembles, at any rate, so far as can be determined from the comparison of internal casts. Yet it evidently differs from that species, in having the scars of its pedal muscles nearly marginal, and placed *directly* over those of the anterior adductors, instead of partly behind them upon the internal ridge. This ridge is also stronger in our species; while the basal margins of its valves are likewise more sinuous.

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This shell is also scarcely distinguishable from a form that has been regarded as a variety of *P. subcuneata*, Meek & Hayden, in the Permian and Permian carboniferous beds of Kansas. Whether specifically identical with this Kansas shell, (the supposed variety of *P. subcuneata*,) may admit of some doubt; but it certainly differs materially from the typical form of *P. subcuneata*, not only in attaining a much larger size, but in its distinctly sinuous instead of convex basal margin; also in the presence of radiating postero-dorsal costæ.

*Locality and position.* North branch Saline Creek, Gallatin County, Ill., in a bed belonging to the upper Coal Measures.

*PLEUROPHORUS? ANGULATUS, M. & W.*

Shell oblong, about twice and a half as long as high, rather convex; cardinal and ventral margins straight and parallel, or the latter very faintly sinuous along the middle; posterior side (which is a little imperfect in our specimen,) apparently obliquely truncated above, and very narrowly rounded below; anterior side very short, sloping abruptly from the beaks above, and abruptly rounded beneath; hinge line very straight, rather long, but shorter than the base. Beaks depressed upon a line with the dorsal outline, and located very near the anterior margin; umbonal ridge prominent and distinctly angular from the beaks to the posterior basal extremity. Surface of internal cast, showing faint traces of two or three distant, very obscure, concentric ridges, or undulations.

Length, 0.52 inch; height, 0.20 inch; convexity, 0.16 inch.

This is one of the kind of forms usually referred by palæontologists to *Cypricardia*, but as we very much doubt the existence of that genus, as properly restricted to such types as the recent *C. guinoca*, Lamarek, during the deposition of the palæozoic rocks, we have concluded to refer it provisionally to the genus *Pleurophorus*. Until its hinge and internal characters, however, can be more clearly determined, its true relations must remain doubtful.

The most marked peculiarities of the species are its oblong form, straight and parallel cardinal and ventral margins, and distinctly angular umbonal ridge. Its anterior muscular impressions seem not to be as distinct as usual in the genus *Pleurophorus*, but this may be due to a defect in our specimen, which is an internal cast. All we know of the hinge, is an impression of a long, linear posterior lateral tooth, parallel to the cardinal margin, and most distinct behind. This tooth appears to have been double in the left valve, for the reception of a similar elongated tooth in the right.

*Locality and position.* Wabash Cut-off, near New Harmony, Indiana.

*PLEUROPHORUS COSTATIFORMIS, M. & W.*

Shell elongate, suboval, moderately convex, slightly arcuate; the dorsal and ventral margins rather long and nearly parallel, the former being a little concave in outline, and the latter convex; extremities narrowly rounded. Beaks small, depressed, or scarcely rising above the dorsal margin,—oblique, somewhat compressed, incurved, and placed very near the anterior end; lunule small, moderately deep. Surface ornamented by concentric striæ of growth, and a few stronger concentric ridges, crossed on the postero-dorsal and dorsal regions, by five distinct equidistant, radiating ridges or plications, extending obliquely from the beaks to the posterior margin. Of these plications, the lowest is the most prominent, and forms the umbonal ridge; while the upper one runs parallel to the cardinal margin, and forms the boundary of the long corselet or escutcheon. (Hinge and interior unknown.)

Length, about 1.10 inch; height, 0.46 inch; convexity, 0.43 inch.

At the same time that we propose to name this as a new species, we confess that if we had found it in Permian strata, we should have, from its 1865.]

external characters at least, referred it to *Pleurophorus costatus*, Brown, (sp.) Indeed it seems to be as nearly like Prof. King's principal figure of that species, (f. 13, pl. xv, Perm. Foss. of England,) as any other individual specimen could possibly be expected to be, and more nearly like it than any other figure of that shell we have ever seen. Nevertheless, from the different horizons occupied by these shells, we have scarcely a doubt that, if we could see the hinge and interior of that now before us, good specific differences would be observable.

*Locality and position.* Keokuk division of the subcarboniferous series, Warsaw, Illinois.

Genus GRAMMYSIA, De Verneuil, 1847.

GRAMMYSIA ? RHOMBOIDALIS, M. & W.

Shell rather large, very gibbous, presenting a rhombic form as seen in a side view, and a distinctly cordate outline as seen in an anterior or posterior view; umbonal slopes extremely prominent and very oblique; beaks nearly terminal, approximate at their points, rising above the hinge line, and distinctly curved inwards and forwards; anterior and antero-ventral regions immediately in front of the oblique umbonal ridge, abruptly contracted, with a broad undefined depression extending from the front part of the beaks obliquely to a point near the middle of the base; dorsal region between the umbonal ridge and the cardinal margin, a little concave near the beaks. Posterior margin obliquely truncated with a moderately convex outline to the posterior basal extremity, which is subangular, or very narrowly rounded; base rather long, a little convex in outline behind the middle, and straight or slightly sinuous just in front of it, but rounding obliquely upward anteriorly. Anterior side (which is imperfect in our specimen) short, or apparently scarcely projecting beyond the beaks, more or less obliquely rounded and somewhat gaping; cardinal margin (judging from casts) rather short, and inflected so as to form behind the beaks a distinctly defined, rather wide depression or esutcheon. Surface, as near as can be determined from casts, ornamented with small, regular concentric ridges. Hinge, muscular and pallial impressions unknown.

Length, about 3.55 inches; height, 2.06 inches; greatest breadth (near the middle of valves), 2.42 inches.

The most marked peculiarities about this shell, are the remarkable prominence and obliquity of its umbonal ridges,—which near the beaks stand out as if compressed antero-posteriorly,—and the nearly terminal, obliquely incurved character of the beaks. The specimen is not in a condition to show whether or not it has a distinct lunule in front of the beaks, but we suspect that it has. In some respects it resembles in form *Cyrtodonta Hindi* of Billings, from the Cincinnati group, or so called Hudson river bed of Canada, but differs in having its umbonal ridges so much more prominent as to give greater convexity to the valves; while its umbones, although more prominent, are much narrower in their antero-posterior diameter. More important differences, however, are the presence of a broad undefined sulcus extending obliquely from the anterior side of the beaks of our shell, to near the middle of its base, and the apparent slightly gaping character of its anterior side. Notwithstanding the general resemblance of these forms, there can be little doubt but they really belong to distinct families, since the Canadian shell doubtless belongs to the *Arcidae*, while that before us appears to be related to the *Anatinidae*.

Although we have placed our shell provisionally in the genus *Grammysia*, we strongly suspect that when its hinge and interior can be seen, it will be found to be either generically or subgenerically distinct from *G. bisulcata*, Con. sp., the type upon which that genus was founded. At any rate, it differs materially in form, and the prominence of its umbonal ridges, as well as

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in the absence of a mesial ridge extending from the beaks to the middle of its basal margin, from that and other well determined species of the genus.

Should it be found necessary to establish a new genus for this shell, we would propose to call it *Rhombocardia*. We remember a similar, but distinct species, from the New York Hamilton Group, which, if we mistake not, has been described by Mr. Conrad, though we cannot just now recall its name.

*Locality and position.*—Bake-oven, Jackson Co., Illinois, Hamilton Group.

Genus CONOCARDIUM, Brown, 1837.

CONOCARDIUM OBLIQUUM, M. & W.

Shell rather small, obliquely subtrigonal, gibbous; anterior side (posterior of Woodward) very obliquely and abruptly truncated with a forward slope, and flattened so as to present a regular cordate outline in a front view; anterior auricle narrow, but of unknown length; base very short; posterior margin sloping up from the base so as to intersect the hinge at an angle of about 45°, rather widely gaping, and crenate its entire length. Beaks moderately prominent, small, strongly incurved; umbonal slopes very prominent, angular, and directed obliquely forward to the angular anterior basal extremity. Surface ornamented with rather sharply elevated, threadlike, subrenate radiating ribs, narrower than the depressions between; each of these depressions on the posterior and flattened anterior sides of the valves occupied by a smaller intermediate rib; entire surface also marked by fine very regular radiating and concentric striae, so as to produce a neat minutely cancellated sculpturing, as seen under a magnifier.

Length from the posterior extremity to the produced antero-basal angle, 0.70 inch; height from the latter to the beaks, 0.50 inch; length from the beaks to the posterior extremity, 0.37 inch; convexity, 0.44 inch; breadth of posterior hiatus, 0.17 inch.

We know of no other species liable to be confounded with this. Its most marked features are the great backward obliquity of its umbonal axis, by which its beaks are placed even a little behind the middle of the body part of the shell; and the beautiful regular cancellated style of ornament seen between the ribs, under a magnifier.

*Locality and position.*—Coal Measures. Wabash Cut-off, Posey County, Ind.

Genus EDMONDIA, De Koninck, 1842.

EDMONDIA? PEROBLONGA, M. & W.

Shell oblong, the length being about double the height, very inequilateral, moderately convex; the greatest convexity along the oblique umbonal slopes, above and below which the valves are cuneate postero-dorsally, and antero-ventrally. Posterior side distinctly compressed near the extremity, its margin rounded or subtruncate in outline; anterior side very short, less compressed and rather more narrowly rounded than the other; basal and dorsal margins nearly straight and parallel, the former being very slightly convex in outline a little in advance of the middle. Beaks near the anterior end, very oblique, compressed, and but slightly elevated above the hinge margin; umbonal slopes prominently rounded from the beaks obliquely to near the posterior inferior margin. Surface of cast showing only faint traces of a few irregular concentric undulations below the umbonal ridge. (Hinge and interior unknown.)

Length, 2.46 inch; height 1.25 inch. Convexity of a left valve, 0.47 inch.

Although we have but a cast of this shell, showing neither the hinge, internal characters, nor the surface markings, we have thought it should be indicated, as better specimens can scarcely be expected from such a matrix. We confess, however, that we are totally at a loss respecting its generic characters, and merely place it provisionally in the genus *Edmondia*.

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In general appearance this shell approaches *Edmondia? compressa*, of McCoy, (Carb. Foss. Ireland, pl. 13, fig. 10,) but it is rather longer in proportion to its height, and has much less prominent, and more compressed beaks, as well as subangular, instead of rounded umbonal slopes.

*Locality and position.*—Lasalle, Illinois. Siliceous limestone of the Upper Coal Measures.

Genus CHÆNOMYA, Meek, 1865.\*

CHÆNOMYA? RHOMBOIDEA, M. & W.

Shell rather small, short, moderately convex; outline rhombic as seen in a side view; basal and dorsal margins nearly straight and parallel; the former very abruptly curved upwards behind, and more gradually in front; anterior side very short and truncated or a little rounded; posterior side distinctly truncated (obliquely) nearly the entire breadth or height of the valves, gaping but not dilated; dorsal margin less than the entire length of the shell, and inflected so as to form a narrow but well defined escutcheon or false area. Beaks narrow, or compressed antero-posteriorly, rather pointed, prominent and incurved, nearly terminal or placed directly over the anterior margin. Umbonal slopes oblique, very prominent near the beaks, but less so along the central and postero-ventral regions; anterior and ventral regions abruptly cuneate, with a very faint undefined impression extending from the beaks obliquely backwards, towards the middle of the base, just in front of the umbonal prominence. Surface of cast ornamented with small, regular concentric undulations, with apparently very faint indications of very small radiating striae.

Length 1·17 inches; height from ventral to cardinal margin, 0·80 inch, do. to summit of beaks, 0·90 inch; convexity, 0·65 inch; gape of valves behind, 0·25 inch.

Although this species seems to agree, in most of its known characters, with the types upon which the genus *Chanomya* was established, it differs in being a proportionally shorter and less widely gaping shell, while its beaks are much more prominent and oblique. As we know nothing of its hinge or interior, nor of its finer surface markings, it is only provisionally that we place it in the genus *Chanomya*. Possibly we should call it *Allorisma rhomboidalis*, or *Sedgwickia rhomboidalis*.

*Locality and position.*—St. Louis Limestone, of Subcarboniferous Series. Alton, Illinois.

CHÆNOMYA? HYBRIDA, M. & W.

Shell longitudinally oblong, moderately convex, somewhat arcuate; dorsal margin concave in outline, ventral border longer than the dorsal, and forming a broad gentle curve nearly parallel to the dorsal outline, excepting a very faint sinuosity in advance of the middle; posterior side a little compressed near the extremity, but rather distinctly gaping—truncated or somewhat rounded in outline; anterior margin sloping forward from the beaks above, and apparently narrowly rounded below. Beaks moderately prominent, somewhat compressed, and placed less than one-fourth the length of the valves from the anterior extremity; umbonal slopes not prominent; flanks evenly convex in the central region, and a little contracted anteriorly, so as to form a very faint undefined depression from the beaks to the base. Surface (of a cast) showing small, obscure concentric ridges, which are most distinct and regular along the posterior umbonal slopes, where they are abruptly deflected upward at an obtuse angle; anteriorly they are smaller, more closely arranged, and deflected obliquely forward and upward.

\* In describing the genus *Chanomya* in the Paleontology of Up. Mo., p. 42, 1866, some doubts were expressed by me, in a foot note, whether or not it might be identical with *Anthraco-myia*, of Salter, a description of which I had not at that time seen. Since seeing Mr. Salter's figures and description, I am entirely satisfied that these forms belong to clearly distinct genera.—F. B. M.

Length, 1.90 inches; height to cardinal margin, 0.90 inch; to summit of beaks, 1 inch; convexity, 0.68 inch.

This is another form that can only be referred provisionally to the genus *Chanomya*, since we know nothing of its hinge and muscular and pallial impressions. It has the form of the typical species of that group, excepting that its posterior extremity is more compressed, and not so widely gaping. Its most peculiar surface character, is the abrupt deflection of its obscure concentric ridges, which give it much the appearance of a *Goniomya*. Indeed if found amongst Cretaceous or Jurassic fossils, we would not hesitate to refer it to that genus. As in some species of *Goniomya*, the ridges run parallel to the base along the middle of the valves, between the points where they are deflected. Perhaps we should call it *Allorisma hybrida*, but for the present we refer it provisionally to the genus *Chanomya*. We know of no species with which it is liable to be confounded.

*Locality and position.*—Keokuk division of the Subcarboniferous Series; Nauvoo, Illinois.

Genus SEDGWICKIA, McCoy, 1844.

SEDGWICKIA (SANGUINOLITES?) SUBARCUATA, M. and W.

Shell elongate, suboval, somewhat arcuate, rather convex in the central anterior, and umbonal regions; anterior side sloping, with a slightly convex outline from the beaks forward, and rather narrowly rounded at the extremity; posterior side narrow and compressed above and behind the umbonal ridge, and obliquely truncated at the extremity; dorsal outline horizontal and concave behind the beaks; ventral margin forming a long gentle convex curve, nearly parallel to the dorsal margin, curving up gradually towards the front, and very abruptly at the posterior basal extremity. Beaks moderately prominent, and placed about one-third the entire length of the shell from the anterior extremity; umbonal ridge prominently rounded from the beaks to near the posterior basal extremity. Surface of cast without visible concentric ridges or other markings.

Length, 2.20 inches; height, 0.95 inch; convexity, 0.72 inch.

We are by no means sure that this shell belongs to the genus *Sedgwickia*, as properly restricted to such forms as *S. attenuata* and *S. corrugata* of McCoy, since it is more elongated, and wants the concentric ridges usually seen on these shells. In general outline it approaches some species of *Cercoomya*, Agassiz, such for instance as *C. striata*, from the upper jura, but its posterior umbonal ridge is not so angular, while its surface, judging from internal casts, seems to have been very nearly smooth. As we only know it from casts, nothing can be determined in regard to its hinge, nor have we any means of ascertaining the nature of its muscular and pallial impressions. Possibly we should call it *Allorisma subarcuata*, though its rather prominent umbonal ridge, compressed posterior dorsal region, apparently smooth surface, and convex anterior slope, without a depression in front of the beaks, give it a kind of *Lyonsia* like aspect, not seen in the known species of that genus.

*Locality and position.*—Upper beds of the Keokuk division of the Subcarboniferous series.

#### GASTEROPODA.

Genus HOLOPEA, Hall, 1847.

Subgenus ISONEMA, M. & W.

ISONEMA DEPRESSA, M. & W.

Shell much depressed, considerably wider than high: volutions nearly four, increasing rather rapidly in size, obliquely compressed, with a slightly convex outward slope above,—last one subangular around the middle, and 1865.]

about as convex below as above the angle; suture well defined; aperture rhomboid suborbicular, more rounded on the inner than the outer side; outer lip sharp and oblique in outline; inner lip flattened, or somewhat furrowed below, apparently for the reception of the edge of an operculum; umbilical region very slightly impressed, but not perforated. Surface ornamented with strong, very regular, transverse lines, most distinct on the upper side of the whorls, where they cross from the suture a little obliquely backwards, with a slight forward curve, to the periphery, over which they cross in the same oblique direction, and pass on towards the umbilical region without any visible curve.

Height, 0.41 inch; breadth, 0.50 inch.

This shell may be regarded as the type of a group<sup>f</sup> apparently related to *Holopea* and *Cyclonema*, though it may be distinct from both. In some respects it seems more nearly related to the latter group, but differs from the known species of that genus, in having no traces of revolving lines. From the typical forms of *Holopea*, it differs in having its volutions much less rounded above, and more prominent or subangular around the middle, and its transverse lines much more distinct. In its surface markings, and general appearance, it very closely resembles *Isonema bellatula* (*Loxonema bellatula*,\* Hall, Fifteenth Report of Regents, pl. 4, fig. 4,) evidently belonging to the same group, but it differs specifically in being much more depressed, or almost subdiscoidal.

Judging from some Ohio specimens, apparently identical with *Isonema bellatula*, Hall, (sp.,) it seems probable that some species of this group may be slightly umbilicate.

*Locality and position.*—White Sulphur Springs, Delaware County, Ohio, Hamilton division of the Devonian series.

#### Genus PLEUROTOMARIA, DeFrance, 1825.

##### PLEUROTOMARIA (MURCHISONIA?) META, M. & W.

Shell rather small, conical; spire elevated; volutions six or seven, rounded, increasing regularly and gradually from the apex; last one slightly produced below, and forming about one-third of the entire length. Suture deep and well defined, in consequence of the convexity of the whorls. Spiral band flat, smooth, scarcely impressed below the general surface, and placed near the middle of the whorls; one third as wide as the volutions of the spire. Surface without revolving striae, or ridges, but ornamented by small, regular, oblique costae, which in crossing the upper side of the whorls, curve gracefully backwards as they approach the band, below which they are nearly obsolete and curve forward. Aperture orbicular; columella apparently perforated by a very small umbilicus.

Length, 0.37 inch; breadth, 0.23 inch; apical angle regular, divergence about 40°.

This species will be distinguished by its produced conical spire, and rounded, gradually enlarging volutions, which characters give it an intermediate appearance between the genera *Murchisonia* and *Pleurotomaria*. In form it is much like *Pleurotomaria trilineata*, Hall, but it differs from that species in being entirely without revolving markings.

*Locality and position.*—Warsaw, Illinois. Keokuk division of Subcarboniferous Series.

#### PTEROPODA.

##### ? Genus CONULARIA, Miller, 1818.

##### CONULARIA MULTICOSTATA, M. & W.

Shell with sides equal and tapering to the apex at an angle of about 22½°;

\* We cannot believe these forms can be properly included in the genus *Loxonema*, as restricted to such shells as the typical *Terebra sinuosa*, of Sowerby.

furrows at the angles distinct and linear; sides without a mesial furrow. Costæ exceedingly fine and closely arranged, arching gently towards the aperture, and sometimes interrupted or alternating at the middle; most distant at about 0.80 inch from the apex, where there are 10 or 11 in the space of 0.20 inch, while about 18 occupy the same space near the aperture; all, as well as the depressions between, very minutely crenate or granulose.

Length, 1.30 inches; breadth, 0.80 inch.

This species is remarkable for its extremely slender, and closely crowded costæ, which are not readily seen at a little distance; and it is only under a good magnifier that the very minute crenulations can be seen. The spaces between the costæ are slightly wider than the costæ themselves, and apparently marked by minute cross-lines, or crenulations, coincident with those of the costæ. Sometimes they appear to be obsolete on the costæ, and more distinct in the depressions. It is very distinct from all of the described species known to us.

*Locality and position.*—Richfield, Summit County, Ohio. Waverley Sandstone, 50 to 60 feet below the Millstone Grit.

*CONULARIA SUBCARBONARIA, M. & W.*

Shell very large, very thin, more or less distinctly and nearly equally four-sided, the sides and angles being somewhat rounded, and converging towards the smaller extremity, at an angle of about  $15^{\circ}$ ; section quadrangular, mesial furrow along each side very obscure, those at the angles distinct; aperture subquadrangular, or subrhombic and contracted; lip very profoundly notched, or divided at the angles, so as to form four triangular flaps or appendages, with inflected lateral margins. Surface ornamented with numerous, slender, transverse costæ, which arch slightly towards the aperture in crossing each side, without any interruption or backward curve at the obscure mesial sulcus; costæ regularly crenate, and separated by slightly wider depressions near the middle of the shell, but much more crowded towards the aperture; depressions between the costæ, with very obscure transverse furrows, coincident with the crenatures of the costæ.

Length, about 4.25 inches; greatest breadth, measuring diagonally across between opposite angles of an obliquely compressed specimen, 1.63 inches; greatest breadth of one side, 1.23 inches. Number of costæ in the space of 0.20 inch, near the middle of the shell, 10; do. near the aperture, about 20. Number of crenatures in the same space on each of the costæ, 20.

In general appearance, the species of this genus usually present comparatively little difference, and often they resemble so closely in their ornamentation, as not to be very readily distinguished. Probably the most marked peculiarity of this species is the presence of sharply defined notches in the lip, at the corners, extending down nearly an inch from the margins of the aperture, and widening upwards, so as to divide the lip into four subtriangular flaps, which bend a little inwards, so as to contract the aperture, and cause the widest part of the shell to be an inch or more below its upper extremity. Our specimen is not in a condition to show whether these flaps are pointed or truncated at the extremity.

This species will be readily distinguished from the last by its coarser, and more widely separated, as well as more coarsely crenate costæ, even where the deep notches of its lip cannot be seen.

*Locality and position.*—Keokuk division of the Subcarboniferous Series. Warsaw, Illinois.

*CONULARIA WHITEI, M. & W.*

Shell of medium size, tapering at an angle of about thirty degrees. Surface ornamented with distinct, linear, transverse, minutely crenate costæ, which arch upward, or towards the aperture, in crossing the sides, and either pass without interruption, the imaginary mesial line, or more frequently terminate.

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there, those on opposite sides of this line alternating. Depressions between the costæ several times as wide as the costæ themselves, but diminishing regularly and gradually in breadth, from the larger to the smaller extremity of the shell.

Length of a specimen incomplete at the larger end, 2.80 inches; breadth, (as obliquely flattened by pressure), 1.20 inch. Number of costæ near the larger end, in 0.30 inch, 6; do. in same space, 0.75 inch from the smaller extremity, 12.

This species presents a marked contrast to the last, in its more widely separated costæ, as well as in having the costæ much more finely crenate; indeed, to the natural eye, they seem to be perfectly smooth. When carefully examined under a magnifier, however, they are seen to be very minutely crenate.

*Locality and position.*—Waverley Sandstone, Richfield, Summit County, Ohio, 50 to 60 feet below the Millstone Grit.

? Genus TENTACULITES, Schlotheim, 1820.

TENTACULITES TENUSTRIATUS, M. & W.

Shell attaining a rather large size, gradually tapering, and a little curved; annulations large, prominent, rather obtuse near the smaller end; separated by rounded constrictions of about 0.10 inch breadth at the larger extremity of a specimen one inch or more in length. Surface marked by numerous, very fine, regular, closely arranged longitudinal striæ, most distinctly marked in the rounded depressions between the annulations. Aperture circular.

Length, 1.16 inches; breadth at the aperture, measuring upon one of the rings, 0.25 inch; do. between the rings, 0.19 inch; space occupied by four rings and the three intervening spaces at the larger end, 0.30 inch; while the same space includes six rings at the smaller end.

This species resembles rather closely the enlarged figure of a form from the same horizon, referred by Prof. Hall to his *T. flexuosa*, (pl. 78 fig. 26, Palæont. N. Y. Vol. 1.); but its annulations are sharper, and its longitudinal striæ more crowded; while the natural size of the New York species is much smaller.

Dr. Shumard has also described, under the name *T. incurvus*, (Missouri Report, p. 195,) a similar form, though his species is much smaller, with more crowded rings, while it also differs in having minute annular striæ.

*Locality and position.*—Cincinnati Group of Lower Silurian Series. Alexander County, Illinois.

TENTACULITES OSWEGOKENSIS, M. & W.

Shell attaining a rather large size, very gradually tapering to an acute point, distinctly arched, particularly towards the smaller extremity; section circular; annulations rather prominent, somewhat obtuse, from three to three and a half in a space equalling the transverse diameter, diminishing very regularly in size, and in their distance apart, from the larger to the smaller extremity. Surface without longitudinal or (visible) transverse striæ.

Length, 1.45 inches; greatest transverse diameter, 0.16 inch; space occupied by six annulations, and five of the intermediate constrictions, at the larger end, 0.35 inch.

This species has much the general appearance of curved individuals of *T. elongatus*, Hall, from the Lower Helderburg Group, (Upper Silurian) of New York, but is decidedly more strongly arched, proportionally more slender, and has more closely arranged annulations, while it shows no traces of the annular striæ seen on the N. Y. species.

From our *T. tenuistriatus*, described on the preceding page, it will be distinguished by its more slender form, more closely arranged rings, and the absence of longitudinal striæ. The last mentioned character, and its much

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larger size, will also distinguish it from *T. incurvus*, of Shumard, (Missouri Report, pl. B, fig. 6a, b.)

*Locality and position.* Cincinnati Group, of Lower Silurian; Oswego, Kendall Co., Ill.

TENTACULITES STERLINGENSIS, M. & W.

Comp. *T. flexuosus*, Hall. Palaeont. N. Y., i. p. 284, (not ib. 92.)

Shell small, slightly arched, and gradually tapering to a point; section circular; annulations prominent, angular, rising abruptly from the surface, usually about their own breadth apart; constrictions between the annulations with fine, sharply elevated, longitudinal striae, which are not continued upon the rings.

Length, 0.56 inch; breadth at the larger end, 0.08 inch; annulations five in the space of  $\frac{1}{4}$  of an inch at the larger end, and nine or ten in the same space at the smaller end. Longitudinal striae, five in the space of 0.02 inch.

It is not improbable that this will prove to be the form from the so-called Hudson River group, referred by Prof. Hall to his *T. flexuosus*, in vol. I. p. 284, Palaeont. N. Y. As that specific name, however, was founded upon a Trenton fossil, described as being septate, and having nine rings in  $\frac{1}{4}$  of an inch, (being, as is now supposed, the column of a *Cystidian*), the name *flexuosus* could not be properly applied to this form, even if identical with the New York species from the higher position.

It will be distinguished from *T. incurvus*, of Shumard, from the Cape Girardeau Limestone, which it resembles in size and form, by having its annulations arranged about their own breadth, instead of twice that distance apart, as well as in having the longitudinal striae only defined between the rings, instead of also upon them.

It seems to be very closely allied to *T. distans*, Hall, of the Clinton Group, but differs in being curved instead of straight, as well as in being less rapidly expanding towards the larger end.

From the last of the two foregoing species it will be readily distinguished by its much smaller size, more sharply elevated rings, and distinct longitudinal striae.

*Locality and position.* Sterling, Illinois. Cincinnati Group, of the Lower Silurian series.

CEPHALOPODA.

Genus ORTHOCERAS, Auct.

ORTHO CERAS CEREBRISTRIATUM, M. & W.

Shell attaining a medium size, rather rapidly tapering, compressed, (in part probably due to accidental pressure); section elliptical; septa transverse, rather deeply concave, distant less than one-third the greater diameter of the shell at the point of measurement; siphon apparently subcentral. Surface ornamented with numerous, closely and very regularly arranged, equal, thread-like annular striae, of the same breadth as the depressions between, and differing but slightly in size throughout the entire length of the shell.

Length of the typical specimen (which is partly septate and imperfect at both extremities), 12.50 inches; greater diameter at the larger end, 4.20 inches; smaller do. of same, 2.56 inches. Greater diameter of the smaller end, about 2.13 inches; smaller do. of same, 1.08 inches. Angle of divergence, measuring along the narrower sides, 11°. Annular striae, 8 in 0.20 inch at the larger end, and 9 or 10 in the same space at the smaller end.

The most marked character of this species is its very regularly arranged, equal striae, which seem to pass almost, if not quite, directly around the shell. They appear to be simple, uninterrupted and everywhere arranged their own breadth apart. It differs from *O. Lophosi*, from the same rock, in its much  
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more rapid expansion from the smaller to the larger extremity, and in its compressed instead of cylindrical form, as well as in having its striae passing directly around, instead of obliquely.

*Locality and position.* Joliet, Illinois; Niagara Group, of Upper Silurian series.

ORTHO CERAS SUBBACULUM, M. & W.

Shell attaining a moderately large size, slender and gradually tapering; entire length, as inferred from the convergence of the sides towards the smaller extremity, about thirty inches; section elliptical, the smaller diameter being to the larger as about 17 to 24. Length of specimen, imperfect at both extremities, 18 inches, of which the outer or body chamber occupies a length of 7.50 inches, while twelve of the smaller chambers occupy the remaining 10.50 inches; greater diameter at larger end, 3.23 inches; smaller do. of same about 2.10 inches; greater diameter at smaller end, 1.90 inches; smaller do. of same, 1.45 inches. Septa transverse, rather deeply concave, separated by chambers, two and a half of which equal the greater diameter of the shell at the point of measurement. Surface and siphon unknown.

At a first glance this species looks much like *O. Bigsbyi*, Stokes, [= *Ormoceras tenuiflum*, Hall], from the Trenton and Black River Limestones, but on a closer inspection it is found to be more compressed and more gradually tapering, while its septa are considerably more distant, and show no backward curve on either side.

*Locality and position.* Joliet, Illinois. Niagara division of Upper Silurian series.

ORTHO CERAS JOLIETENSE, M. & W.

Shell much elongated, very gradually tapering; section oval or narrow elliptic, (probably to some extent, at least, due to accidental pressure); septa very concave, unusually distant or separated by spaces, equalling three-fourths the greater diameter of the shell at the point of measurement. Siphon and surface unknown.

Length of a septate specimen, imperfect at both extremities, 14.50 inches; greater diameter of do. at larger end, 2.75 inches; smaller do. of same, 1.77 inches; greater diameter at smaller end, 2.16 inches; smaller do. of same, 1.30 inches. Number of septa in the entire 14½ inches, 8.

This species is remarkable for its very gradually tapering form, and unusually distant septa. The latter character will alone distinguish it from any Upper Silurian species known to us, excepting *O. pauciseptum*, Hall, from the Shaly Limestone, of the Lower Heldeburg Group. From this New York species, to which it seems to be nearly related, it will be distinguished by its compressed, instead of cylindrical form. It is true this compression may be in some degree due to accidental pressure, but it seems to be too regular along the entire length of the shell not to be mainly the natural form.

*Locality and position.* Joliet, Illinois. Niagara division of the Upper Silurian series.

ORTHO CERAS NOBILE, M. & W.

Shell attaining a very large size, rather rapidly tapering; section subcircular, or very slightly flattened on one side. Septa deeply concave, extremely thin, distant about one-fifth the diameter of the shell at the point of measurement; siphon central, round. Surface unknown.

Entire length of a septate specimen incomplete at both ends, 18 inches; greatest diameter at larger end, 8½ inches; smaller do. of same, 7 inches. Greatest diameter at smaller end, 5 inches; angle of divergence about 14°; diameter of siphon at larger end, 0.80 inch. The entire length of the shell was probably not less than five feet, and its body chamber, owing to the large size and rapid expansion of the shell, must have been very capacious.

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In form and proportions this large species seems to agree nearly with *O. Munsterianum*, of Koninck, from the carboniferous rocks of Vise, Tournay, but it attains a greatly larger size, and also differs in having its siphon central. It is probably the largest species known in our carboniferous rocks.

*Locality and position.* Randolph County, Illinois. Chester division of Sub-carboniferous Series.

#### ORTHO CERAS WINCHELLII, M. & W.

Shell rather rapidly tapering; section nearly circular, its greater and smaller diameter being as 106 to 100; septa moderately concave, not oblique, distant one-fifth the greater diameter of the shell at the point of measurement, and showing a gentle backward curve in crossing the dorsal and ventral sides; siphon very small at the points where it passes through the septa (probably swollen or beaded between), placed on the shorter axis of the septa only about its own breadth from the margin. Surface nearly smooth, or with more obscure lines of growth, which, like the margins of the septa, make a slight backward curve in crossing the dorsal and ventral sides.

Length of an entirely septate specimen, imperfect at both extremities, 3 inches; greater diameter at the larger end, 1.50 inches; apical angle 15°, apparently becoming greater towards the smaller end.

This species seems to be somewhat similar to *O. occidentale*, of Prof. Winchell, from his Marshall Group (Am. Journ. Sci. vol. xxxiii. 1862, 356), but differs in being more rapidly tapering, and in having its siphon nearly marginal, instead of placed midway between the centre and margin of the septa. If much swollen between the septa, its siphon must be indeed quite marginal at these joints.

Named in honor of Prof. A. Winchell, State Geologist of Michigan.

*Locality and position.* White Sulphur Springs, Delaware County, Ohio. Hamilton Group. Devonian.

#### Genus PHRAGMOCERAS, Broderip, 1834.

##### PHRAGMOCERAS WALSHII, M. & W.

Shell very large, clavato-sublunate in form, moderately arched, increasing rather rapidly in size from the smaller end to near the middle, and thence apparently somewhat tapering towards the aperture; more or less compressed. Outer or body chamber apparently rather short. Septa very oblique, (probably to some extent due to compression and distortion), comparatively closely arranged, the chambers between scarcely equalling one-sixth the greater diameter of the shell at the widest part, and one-eighth towards the smaller end. (Siphon, surface and aperture unknown).

Length of specimen, (imperfect at both extremities), measuring along the middle of the side parallel to the curve, about 15 inches; greatest breadth near the middle, 5 inches; smaller do. at same place, 3.50 inches. Greater breadth at smaller end, 2.40 inches. Of the whole length of the specimen 23 of the smaller chambers form 10 inches, and the remaining portion of the body chamber the other five inches.

The only specimen of this large shell we have seen is very imperfect, and much distorted, so that it is quite probable some of the characters given in the above description, will require more or less correction when good specimens can be obtained. Its large size, general form, and rather closely arranged septa, however, will probably render its identification not very difficult.

The specific name is given in honor of B. D. Walsh, the well known Entomologist, of Rock Island, Ill.

*Locality and position.* Rock Island, Illinois. Hamilton division of the Devonian.

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## Genus GOMPHOCERAS, Sowerby, 1839.

## GOMPHOCERAS SACCOLUM, M. &amp; W.

Shell small, subfusiform, or clavate, very slightly arched; a little compressed at right angles to the plane of the curve, particularly the nonseptate part, which is more convex on the outer side of the curve than the inner; most ventricose a little above the last septum, thence tapering gradually to the lower extremity and towards the aperture, near which latter there is a slight constriction. Section transversely a little oval near the middle of the shell, and more decidedly so above, but nearly or quite circular towards the lower extremity. Aperture transversely oval, its smaller diameter being about two-thirds the greater; lips faintly sinuous at each end of the aperture, and at the middle of the dorsal side. Septa but slightly concave; (distance between them not distinctly determinable from the specimen examined). Siphon very small; placed on the line of the shorter axis of the septa, about twice its own breadth from the dorsal or outer side of the curve. Surface marked only with small annular striæ, slightly arched backwards near each end of the aperture, parallel to the faint sinuosities of the lip.

Length of specimen, imperfect at the smaller extremity, 1.27 inch; do. of nonseptate part, 0.67 inch; greatest transverse diameter of do., 0.53 inch; shorter diameter of do. at same part, 0.42 inch. Apical angle of septate half of the shell, measuring along each lateral margin, 24°. Breadth of aperture, 0.33 inch; smaller diameter of do., 0.22 inch.

This little shell has the general habit and appearance of *Gomphoceras*, and yet differs from the typical forms of that genus in being slightly arched and not having its aperture so remarkably contracted. In being a little curved, it more nearly resembles *Phragmoceras*, though its curvature is less decided. It is also worthy of note, that the comparatively small contraction of its aperture is mainly on dorsal and ventral margins, while in *Gomphoceras* and *Phragmoceras* the contraction is mainly on each lateral margin. In several respects it approaches *Oncoceras*, Hall, and it is even possible that we would be more nearly correct if we were to call it *Oncoceras sacculum*. Still it differs from the type of that group in being less curved, and compressed dorso-ventrally, instead of laterally, as well as in having its siphon not quite, though nearly marginal.

*Locality and position.*—White Sulphur Springs, Delaware County, Ohio. Hamilton Group of Devonian Series.

## GOMPHOCERAS (APIOCERAS) TURBINIFORME, M. &amp; W.

Shell rather small, turbinate, or obovate, very slightly unsymmetrical; section circular, or nearly so; chambered part rapidly expanding, with sides slightly convex above. Non-septate part very short, or three times as wide as long, rounding in abruptly above; aperture contracted, but exact form unknown. Septa only moderately concave, nearly equidistant at all points, excepting near the outer chamber and the apex, where they are more crowded; at about the widest part of the shell, separated by spaces equaling one-eighth its greatest diameter. Siphon small and marginal. Surface nearly smooth, or with only fine lines of growth.

Length of a specimen not quite complete at the smaller extremity, 1.16 inch. Greater breadth (at the junction of the septate and non-septate parts), 1 inch; smaller diameter at the same place, 0.90 inch. Greater diameter at the smaller extremity, 0.82 inch; smaller do. at same place, 0.30 inch. Divergence of apical angle, 30°.

This is a very short turbinate species, somewhat like *G. beta*, Hall, (18th Report Regents, pl. 7, fig. 1), but differs in being proportionally shorter and more ventricose, and in having the septa proportionally more crowded. It shows eleven septa in a space of three-quarters of an inch below the last one, while *G. beta* is described as having only seven or eight in the same space.

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Its last three septa are crowded within a space only equalling one of the chambers below.

*Locality and position.*—Charleston, Indiana. Devonian.

Genus NAUTILUS, Linnæus, 1758.

Subgenus ENDOLOBUS, M. & W.

NAUTILUS (ENDOLOBUS) PERAMPLUS, M. & W.

Shell attaining a very large size, compressed subglobose; umbilicus rather deep, about as wide as the dorso-ventral diameter of the outer volution, and showing about three-fourths of each inner turn. Whorls three to three and a half, increasing rather rapidly in size, broadly rounded over the dorsal or outer side, and more narrowly round on each lateral margin, where the greatest prominence is a little within the middle; lateral margins each provided with a row of large, broad, depressed, or subnodose prominences, about fourteen of which may be counted on each side of the last turn; from these rows of nodes or mammillary protuberances, the inner side of each whorl rounds abruptly into the umbilicus, and is provided along the middle with a moderately deep, rounded concavity for the reception of each succeeding inner turn. Septa deeply concave on the side facing the aperture; separated by intervals, measuring, on the dorsal side, more than one third the dorso-ventral diameter of the whorls at the point of measurement, passing nearly straight over the broad periphery, and with a very slight forward curve across the sides; while on the inner concave side they are each deflected abruptly backwards, so as to form a deep, more or less funnel-shaped ventral lobe. Siphon placed rather more than its own breadth nearer the inner than outer side. Surface of cast smooth.

Greatest diameter, 20 inches; transverse diameter, 12 inches; dorso-ventral diameter of inner whorl, 8 inches; breadth of umbilicus, 8.50 inches; circumference around the periphery, 4 feet 8 inches.

We know of no shell with which this fine species is liable to be confounded, though it has much the form and general appearance of our *N. spectabilis*, from the same position. It differs, however, in the position of the lobe on the inner side of septa; and in having its siphon located farther in from the outer side. In a side view it presents some general resemblance to *N. tuberculatus*, of Sowerby, as figured by Phillip, in his Geol. Yorkshire I. pl. 22, fig. 29, though even as thus seen, it will be observed to differ in its broader whorls, and in having the most prominent part of their sides, with their nodes, placed nearer the umbilicus, while in a profile view, it will be distinguished at a glance by its periphery being rounded, instead of nearly flat.

As may be seen by the foregoing description, this species differs from the typical *Nautili*, in the possession of a peculiar funnel-shaped ventral lobe, formed by the backward flexure of the septa. Hence it seems to bear almost exactly the relations to *Nautilus* that the genus *Tretoceras* does to *Orthoceras*; hence we regard it as the type of a group for which we propose the name *Endolobus*.

If Montfort's name, *Bisiphites*, is to be retained, the name of this shell should doubtless be *Bisiphites peramplus*, as the type upon which he proposed to found a genus under that name, seems to have had an inner lobe which he mistook for a second siphon. As his name, however, implies a plain contradiction of fact, we think it should not be used.

Judging from Montfort's figure, his type not only differs from ours, in having the outer whorl enveloping all the others, so as to leave no open umbilicus, but in having the lobe of the septa a little removed from the inner side, instead of being directly in contact with it, as in our shell. He says his type was a large fossil species, attaining a diameter of two feet.

*Locality and position.*—Randolph County, Illinois. Chester division of Subcarboniferous Series.

1865.]

NAUTILUS (*TEMNOCHEILUS*) NIOTENSIS, M. & W.

Shell attaining a large size, globose-subdiscoidal; umbilicus deep, and (considering the lateral margins of the whorls its limits) about twice the dorso-ventral breadth of the outer turn. Volutions about three, contiguous but not embracing, broadly rounded over the dorsal and ventral sides, and prominently angular around the middle of each lateral margin; section transversely elliptic, the two extremities of the ellipse being angular. Septa rather distinctly concave, and distant on the outer side less than half the dorso-ventral diameter of the whorls at the point of measurement,—making a broad backward curve in crossing the inner and outer sides of the whorls, and curving forward to each of the lateral angles; siphon piercing the septa less than its own breadth outside of the middle. (Surface and aperture unknown).

Greatest diameter, measuring across the disk, about 8.50 inches; convexity, or transverse diameter of the whorls, 5 inches; dorso-ventral diameter of the last volution, about 3 inches.

This species belongs to a group of carboniferous *Nautili*, including *N. coronatus*, McCoy, and *N. biangulatus*, *N. multicarinatus* and *N. cariniferous*, Sowerby, &c. These shells are characterized by having a broad, deep, open umbilicus, showing all the volutions, with the outer side of the whorls broadly rounded or flattened, and the middle of each lateral margin prominently angular; the angle being sometimes nodose, while the transverse diameter of the volutions is always greater than the dorso-ventral. The siphon in these shells is generally, or perhaps always, between the middle and outer side of the whorls. Although Prof. McCoy included a much wider range of forms in his group *Temnocheilus*, we think it would be better to restrict it to such species as those mentioned above, all of which were originally included in the group by Prof. McCoy.

Specifically, our shell is perhaps most nearly allied to *Nautilus cariniferous*, of Sowerby, (Min. con. pl. 482, f. 3 and 4) though differing in its proportionally wider umbilicus, merely contiguous volutions, and particularly in never having longitudinal ridges on the outer side of the whorls, at any stages of growth. It also differs in having its septa crossing the outer side of the whorls with a broad backward curve, instead of passing nearly straight over.

*Locality and position.*—Niota and Warsaw, Illinois. Keokuk Division of Subcarboniferous Series.

Subgenus DISCITES, McCoy, 1844.

NAUTILUS (*DISCITES*) ORNATUS, Hall.

Var. AMPLUS, M. & W.

The shell we here place provisionally as a variety of *Nautilus (Discites) ornatus*, Hall, agrees very nearly in most of its characters with that species, but differs in its much larger size, and the proportionally greater dorso-ventral diameter of its volutions, (particularly the outer one), as compared with the breadth of its truncated periphery. In the New York form, these proportions, according to the published figure, (Thirteenth Regents Report, 1860, p. 102), are about as two and one-third to one, in the outer whorl, and nearly equal in the inner turns; while in our shell they bear the proportions of three to one, the flattened sides of the outer volution being three times as wide as its truncated periphery. The type of the New York species is also described as having its "siphonucle dorsal." If by this it is meant that the siphon is in contact with the outer side of the shell, as in the *Goniatites*, then there can be little doubt in regard to the form under consideration being a distinct species, since its siphon is separated from the periphery by a space about equalling its own breadth. It is probably distinct from the New York species, but as individuals of these older types of *Nautilida* seem to have varied more

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in form than those of more modern date, we have concluded to place it for the present, as a variety of *N. ornatus*.

To facilitate comparison, we would remark that our shell, when entire, must have measured from 10 to 12 inches in its greatest diameter across the disc; while its outer whorl measures about 5 inches in thickness or convexity at the umbilical side, and 1.50 inches at the periphery. The greatest breadth of the sides of the outer turn is about 4.50 inches. Its septa, as seen on each side, are arranged and curved very nearly as in the typical form of *N. ornatus*, and are deflected backwards on the truncated periphery, so as to form a sub-trigonal lobe as deep as wide; they also make a rather broad, deep, backward curve on the inner side. Surface markings unknown.

The shells of this type seem to be very distinct from the typical recent forms of *Nautilus*, and whatever others may think, should, as we believe, be at least regarded as forming a marked subgeneric group. Objections have been raised to the use of McCoy's name, *Discites*, however, because De Haan had used it in 1825 for a type of *Nautilidæ*; but as De Haan merely used it in a kind of synoptical table, with no other characters than "*Sensim incrassata*," without a figure, or any allusion to any type by which the most remote conjecture can be formed in regard to what group of *Nautilidæ* he meant, it must be evident we cannot regard him as having established either a genus or a subgenus, and the name was consequently free to be used by any other author.

*Locality and position*.—Hamilton Group (Devonian); "Devil's Bake-oven," Jackson County, Illinois.

#### NAUTILUS (DISCITES) DISCIFORMIS, M. & W.

Shell attaining a rather large size, discoid, much compressed; umbilicus shallow, a little wider than the dorso-ventral diameter of the outer volution, and showing all the inner turns. Whorls about three and a half, nearly contiguous, or very slightly embracing, nearly flat on each side, the greatest convexity being about half way between the middle and the inner side, from which point the sides round into the umbilicus, and converge to the periphery, which is truncated, narrow and concave. Septa rather closely arranged, crossing the sides of the whorls with a broad, graceful backward curve and more abruptly flexed in the same direction on the truncated periphery, so as to form a sub-trigonal lobe about as deep as wide; also, somewhat curved backwards on the inner side of the whorls. Last chamber long, or forming about half the outer volution; others shallow, or usually about equalling one-fifth the dorso-ventral diameter of the volutions at the point of measurement. Siphon small, suboval, located about its own diameter outside of the middle of the whorls. Aperture and section strongly compressed, subovate, the inner side being rounded, and the outer, which is much narrower, truncated, somewhat emarginate, and biangular. (Surface unknown.)

Greatest diameter across the disc,  $8\frac{1}{2}$  to 9 inches; dorso-ventral diameter of outer whorl nearly 3 inches; greatest convexity of whorls, about 1.50 inches; breadth of truncated periphery, 0.68 inch.

In size, form, proportions, breadth of umbilicus, &c., as well as in the arrangement and curvature of its septa, this species seems to agree almost exactly with the *discus* of Sowerby. If that species has been correctly figured and described, however, our shell presents the important difference of having its siphon located a little outside of the middle, instead of near the inner margin of the whorls.

*Locality and position*.—Niota, Hancock County, Illinois. Keokuk Division of Subcarboniferous Series.

#### NAUTILUS LASALLENSIS, M. & W.

Shell attaining a medium size, compressed, subglobose, or subdiscoidal; umbilicus more than half as wide as the dorso-ventral diameter of the last 1865.]

whorl at the aperture, moderately deep, and showing about half of each inner turn. Volutions increasing rather gradually in size, very slightly compressed on the dorsal and lateral surfaces, but without the compression imparting any angularity to the dorso-lateral and ventral margins, which are rounded; each concave within for the reception of the inner turns. Septa moderately concave, separated by spaces measuring, on the dorsal or outer side, less than one-third the dorso-ventral diameter of the whorls at the point of measurement, all crossing the sides and dorsum with a broad backward curve. Siphon scarcely more than its own breadth from the ventral or inner side. Aperture judging from the section of the whorls, about as wide transversely as its diameter, in the direction of the plane of the shell, subquadrilateral, or approaching subreniform, in consequence of the sinuosity of the inner side. Surface unknown.

Greatest diameter about 4.70 inches; convexity about 2.75 inches; breadth of umbilicus, 1.45 inches.

*Locality and position.*—Upper Coal Measures, Lasalle, Illinois.

Subgenus CRYPTOCERAS, d'Orbigny, 1847.

NAUTILUS (CRYPTOCERAS) CAPAX, M. & W.

Shell attaining a moderately large size, subglobose in form. Umbilicus deep, with abruptly sloping walls,—one third as wide as the dorso-ventral diameter of the outer whorl, and showing each of the inner turns. Whorls about two and a half, increasing rapidly in size, particularly in breadth; last one so expanded laterally as to be apparently one third to one half wider than its dorso-ventral diameter; inner ones proportionally narrower. All broadly rounded on the outer side, and more narrowly rounded with a flattened or slightly concave revolving space between the ridge bounding the umbilicus and the middle of each side; each provided with a narrow, shallow impression along the ventral side for the reception of the inner volutions. Septa separated by spaces which measure, on the outer side, less than one fourth the dorso-ventral diameter of the volution at the point of measurement; a little arched backwards on the slightly concave inner side of the whorls, and less distinctly so on the narrow revolving flattened space just outside of the umbilicus, after which they cross over the broadly rounded outer side, with a very broad, scarcely perceptible backward curve. Aperture transversely oval, or subelliptic. Outer chamber very capacious, composing less than half of a volution. (Surface unknown).

Greatest diameter across the disc, about 7 inches; breadth (transverse diameter of the aperture), 6 inches; dorso-ventral diameter 3.25 inches; breadth of umbilicus 1 inch.

The only specimen of this species we have seen is a cast, which shows, along the outer side of the whorls, the appearance of a tube 0.20 inch in diameter, extending backwards from each septum. It is barely possible that this may be a small lobe, but we have scarcely any doubts in regard to its being the siphon, and hence that the species belongs to the group *Cryptoceras*.

Compared with *N. dorsalis*, Phillips (Geol. Yorks, ii. pl. xviii. fig. 1 and 2), the type of the group *Cryptoceras*, our shell will be found to differ in its much more broadly rounded dorsum, and much wider mouth, as well as in the peculiar revolving flattened space near the umbilical side of the whorls, which imparts a slight angularity to the margin of the umbilicus, as well as an undefined longitudinal ridge, or prominence near the middle of the whorls on each side.

*Locality and position.*—Charboniere, Missouri. Coal Measures.

NAUTILUS (CRYPTOCERAS ?) LEIDYI, M. & W.

We only know this shell from the non-septate portion,—forming about one

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third of a volution. It indicates a subglobose form for the entire shell, and shows that the umbilicus was deep, with rather abrupt walls, and about as broad as three-fourths the dorso-ventral diameter of the body whorl at the aperture. From the curve, and rapid increase in size of the outer chamber, it is evident there could not have been more than two and a half volutions, which are rather broadly rounded over the dorsum and sides, to the margins of the umbilicus, into which the sides round rather abruptly. Towards the aperture, the steep, somewhat flattened inner side of the volution forming the walls of the umbilicus, meets the lateral margins, so as to form a pinched out prominence, that must have imparted a peculiar angularity to the inner margin of the aperture on each side. Just outside of this prominence, the ventro-lateral sides of the outer whorl at the aperture are a little flattened. The aperture is one-fourth wider than its dorso-ventral diameter, and forms about three-fourths of a circle, being deeply rounded on the dorsal side, much flattened within, and angular or apparently abruptly sinuous at each inner lateral margin. These angles at the inner lateral margins, seem even to have projected out somewhat, as in the recent *Argonauta gondola*, of Adams, though not to the same extent. The lip is rather deeply sinuous at the middle of the dorsal side. The septa were moderately concave, and slightly arched backward on each side. (Siphon and surface unknown).

Greatest diameter of the shell, about 3.75 inches; greatest breadth (at the inner side of aperture), 2.65 inches.

As we have not seen the siphon of this species, we are not sure that it belongs to the group *Cryptoceras*, but from its analogy to the species just described under the name *capax*, which shows apparently a dorsal siphon, we are led to infer that it probably possesses the same character. It differs from that shell, however, in having its body whorl less rapidly expanding, and without a depression along the inner side for the reception of the inner whorls.

Named in honor of Prof. Joseph Leidy, of Philadelphia, Pa.

*Locality and position.*—Warsaw, Illinois. Keokuk division of the Subcarboniferous Series.

#### Genus TROCHOCERAS, Barrande, 1847.

##### TROCHOCERAS? BAERI, M. & W.

Shell subdiscoidal, consisting of about two or three rather rapidly enlarging volutions, which are more broadly rounded on the outer surface than on each side, and about one-fourth wider transversely than their dorso-ventral diameter; each inner whorl slightly impressing the inner side of the succeeding turn. Umbilicus a little more than half the dorso-ventral diameter of the outer volution, and showing all the inner volutions. Spire apparently scarcely rising above the upper surface of the last turn. Septa rather distinctly concave on the side facing the aperture, separated on the outer side of the whorls, at a point where the dorso-lateral diameter is about 1.25 inches, by spaces measuring 0.35 inches—all showing a very slight backward curve on the rounded periphery, and passing nearly straight across each side. Surface, siphon, and non-septate portion of the shell unknown.

Greatest breadth of the septate part of the shell, 5 inches; height, (estimated) about 2.50 inches. Dorso-ventral diameter of the volutions, increasing about three-fold each turn.

The specimen from which this description was drawn up is defective on one side, so that it is not easy to determine whether or not its whorls are coiled in the same plane, though they have the appearance of being somewhat oblique, and hence we have placed it provisionally in the genus *Trochoceras*. Should it be found, however, when more nearly entire specimens can be examined, that its whorls are coiled all upon the same plane, it would belong either to the genus *Lituites* or *Nautilus*, and hence its name would become *Lituites Baeri*, or *Nautilus Baeri*.

1865.]

The typical specimen does not show the position of the siphon, but a fragment found near the same locality, and at the same horizon, apparently of this species, though possibly belonging to another shell, has the siphon placed about its own breadth outside of the centre. It pierces the septa from without inwards or backwards, as in *Nautilus*.

At a first glance this shell would seem to resemble *Cryptoceras* (*Lituites*) *undatus*, as represented by fig. 3, pl. 13, vol. i. Palaeontology of New York, but on a closer inspection, it will be at once seen to differ materially in the more rapid increase in the breadth of its whorls, and in the proportionally smaller size and greater depth of its umbilicus, as well as in being apparently not coiled on a plane.

The specific name is given in honor of Dr. O. P. Baer, of Richmond, Indiana, to whom we are indebted for the use of the typical specimen.

*Locality and position.*—Richmond, Indiana. From the Cincinnati Group of the Lower Silurian Series.

### ARTICULATA.

### CRUSTACEA.

### TRILOBITA.

Genus DALMANIA, Emmerich, 1845.

DALMANIA DANÆ, M. & W.

Attaining a large size, entire outline ovate, approaching subelliptic. Cephalic shield rather compressed, nearly semicircular, about twice as wide as long, rounded in front, and nearly straight or slightly concave in outline behind, with posterior lateral angles produced into mucronate spines extending backwards to the fourth thoracic segment. Glabella composing rather more than one-third the entire area of the shield, but slightly more convex than the cheeks; including the neck segment, as long as its greatest anterior breadth, and about twice as wide in front as behind; separated from the cheeks on each side by a well defined furrow; anterior lobe composing about half its entire area, transversely elliptical, and a little less than twice as wide as long; lateral furrows well defined, anterior one oblique; the other two transverse, and not always strongly defined quite out to the lateral margins; anterior lateral lobe longer, more oblique, and at its outer end wider, than either of the other two. Occipital segment widest and most prominent in the middle, scarcely equalling the transverse diameter of the posterior extremity of the glabella; neck furrow well defined, but deepest on each side, and arching a little forward in the middle; its continuations across the posterior sides of the cheeks broad, deep, and straighter than the posterior margin,—extending nearly to the lateral margins of the cheeks, where they curve a little backwards. Cheeks sloping slightly around the outer side, to a broad, shallow, undefined marginal depression, outside of which there is a moderately thick, somewhat rounded border, which does not extend entirely around the front of the glabella, but continues back into the posterior lateral spine. Eyes reniform, not oblique, nearly half as long as the antero-posterior diameter of the front lobe of the glabella, and situated slightly more than their own length in advance of the posterior margin of the cheeks; with (in casts) a moderately distinct marginal furrow around their outer bases, (height and other details unknown); palpebral lobes semicircular and depressed. Facial sutures cutting the lateral margins of the cheeks nearly opposite the posterior extremities of the eyes, and passing around the antero-lateral and front margins of the glabella, so near the anterior border as scarcely to leave any perceptible band connecting the movable cheeks around the front.

Hypostoma obscurely subtriangular, about one-eighth wider posteriorly than its length, moderately convex; anterior margin forming a broad, regular con-

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vex curve; lateral margins contracted behind the anterior lateral angles, and converging a little posteriorly, for about two-thirds the entire length, thence more abruptly to the posterior extremity, which is transversely truncated, and provided on each side with a minute, slightly projecting point; while still farther forward on each lateral margin, there appears to be traces of another minute slightly projecting irregularity of outline. Around the anterior and lateral margins, there is a more or less distinct sulcus, behind which the posterior margin is flattened. Within this marginal sulcus there is, on each side a little behind the middle, an oblique eye-like depression.

Thorax wider than long, the length being to the breadth, as 21 to 28, nearly once and a half as long as the cephalic shield; mesial lobe as wide anteriorly as the posterior extremity of the glabella, and very slightly broader near the middle, where it is about three-fourths as wide as the lateral lobes, from which it is only separated by narrow, rather shallow furrows—most convex along the middle and flattened on each side; segments not clearly seen in the specimens examined. Lateral lobes somewhat more depressed than the mesial one, and sloping very gradually to the lateral margins. Segments equalling the antero-posterior diameter of the posterior lateral lobes of the glabella; each curving abruptly backwards at the outer extremity, and terminating in a flat, sharply pointed, or lanceolate projection, most produced in the posterior ones; provided with a deep, well defined, longitudinal furrow, which starts from the anterior side of the inner end, and passes at first a little obliquely outwards, and then straight outward, slightly nearer the posterior than the anterior margin, to the middle of the flattened scythe-shaped outer ends, where they usually curve a little backwards and become obsolete.

Pygidium nearly semielliptic, or subtrigonal, the anterior lateral angles being rounded, and the lateral margins converging to the more or less pointed posterior extremity, with a broad convex curve; slightly longer than the cephalic shield, and rather more than two-thirds as wide; mesial lobe somewhat more convex than, and two-thirds as wide as the lateral lobes, gently rounded, and tapering gradually to the posterior extremity, where it is apparently continued into an abruptly projecting caudal appendage; segments 12 to 13, straight, well defined (excepting near the termination) by distinct furrows, which are deeper on each side than at the middle. Lateral lobes with eight or nine well defined arched segments, which become more oblique posteriorly, and are defined to near the edge of the smooth margin; each divided by a furrow deeper than those between, and like those of the thoracic ribs, the anterior division being slightly shorter than the other.

Surface (of cast) smooth, excepting traces of small, scattering tubercles on the anterior lobe of the glabella.

Entire length of the largest specimen seen (exclusive of the little caudal appendage, the length of which is unknown), 4.93 inches. Length of pygidium, 1.43 inches; breadth of do. 2 inches; breadth of its axillary lobe, 0.57 inch. Length of thorax, 2.10 inches; breadth of do. 2.63 inches; breadth of its mesial lobe, 0.80 inch. Length of cephalic shield, 1.40 inches; breadth of do. 3 inches; length of posterior lateral spines, near 0.95 inch; length of glabella exclusive of neck segment, 1.30 inches; anterior breadth of same, 1.35 inches; posterior breadth of do. 0.84 inch. Length of eyes, 0.39 inch; distance of same from posterior margin of cheeks, 0.42 inch.

Named in honor of Prof. James D. Dana, of New Haven.

We have described this fine species in as much detail as possible, because it is somewhat nearly allied to several of the already described species. Perhaps it is most nearly allied to the well known European *D. caudata* of Brunich, with which it agrees in size, form and many of its details. In the first place, it differs, however, from that species in having the anterior margin of its cephalic shield decidedly more rounded than even the variety or form regarded by Mr. Salter as the female, while it shows no marginal rim (as seen from above) extending around the front of the glabella. Again, the eyes, in 1865.]

stead of being placed about *half* their own length in advance of the posterior margin of the buckler, are rather more than their *entire* length from the posterior margin. The produced spine-like appendages of its cheeks are also, in all our specimens, uniformly distinctly smaller, and only extend back to about the termination of the fourth thoracic segment, instead of to the sixth, as in *D. caudata*. On comparing the hypostoma of our species with Mr. Salter's excellent figures of that of Brunich's species, it is found to present marked and decided differences, which it would be tedious to go over in detail, and which would scarcely be intelligible without the aid of figures. In the ribs of the thorax we also observe differences, those of our species being more distinctly deflected backwards, and more sharply produced at their outer extremities, particularly the posterior ones. The differences in the pygidium are likewise well defined, its lateral margins forming almost a regular convex arch from the antero-lateral rounded angles to the caudal projection (which seems to be shorter, and is much narrower than *D. caudata*), instead of being nearly straight, or even concave in outline, posteriorly.

Most of these differences we have ascertained from a careful study of a good series of specimens, to be constant in our species, so that they can be relied upon as not being individual or sexual peculiarities.

In some respects this species is probably even more nearly allied to the common American *D. limulurus*, while in others it differs more widely. In size it far exceeds the largest examples of *D. limulurus* we have ever seen, while all our specimens show the difference in the obtusely rounded anterior extremity of the head, and the absence of a marginal rim around the middle of the front to be constant. The convex outline of the lateral margins of its pygidium, already mentioned, also contrasts strongly with that of *D. limulurus*, and even the largest specimens of our species, five inches in length, only show twelve to thirteen segments in the mesial lobe, instead of fifteen, as in the New York species. The caudal appendage, if produced at all, must also be much narrower at its origin in our species.

The greater number of segments in the mesial and lateral lobes of the pygidium, and the distinct granular surface of both *D. pleuroptyx* and *D. micurus*, will alone serve to distinguish them from the species under consideration; while the hypostoma of *D. micurus*, at least, is entirely different.

If the name *Dalmania* cannot be retained for this genus, in consequence of its having been previously used for a genus of *Diptera*, Hawle and Corda's name *Odontocheile* will probably have to be adopted for it, in which case this species will have to be called *Odontocheile Dana*.

*Locality and position.* Two miles above Thebes, Alexander County, Illinois. Upper Silurian.

#### Genus LICHAS, Dalman, 1827.

##### LICHAS CUCULLUS, M. & W.

Glabella very convex; middle lobe strongly elevated, or subconic, nearly three times as wide anteriorly (measuring around the front) as behind, sloping abruptly from the highest point behind the middle, with a straight, or slightly concave outline, back to the neck furrow, and rounding with a regular, convex, rapidly descending curve, to the rounded front; lateral slopes declining abruptly, and separated from the lateral lobes by a linear but well defined furrow, arching forward from the neck furrow, and curving laterally on the anterior slope. Lateral lobes about half as high, and three-fourths as long as the middle one, from which they slope abruptly outwards; nearly as wide behind as the posterior extremity of the middle lobe at the neck furrow, but not more than half its breadth at the summit, and less than one-third its anterior breadth. Outside of these, on each side, the much smaller and lower palpebral lobes are separated from them by a linear furrow, similar and nearly parallel to those separating the lateral lobes from the central one.

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Neck furrow moderately well defined; neck segment very much depressed below the other parts, and sloping backwards; apparently equalling the breadth across between the two outer lobes.

Surface showing, under a magnifier, small, unequal, rather scattering pustules, with smaller intermediate granules.

Length, including the neck segment, 0.70 inch, do. excluding same, 0.52 inch; height, 0.48 inch; breadth, 0.96 inch; do. of middle lobe at posterior extremity, 0.25 inch; do. of same at summit, 0.41 inch; do. of same at front, 0.60 inch.

Compared with the corresponding parts of *L. Trentonensis*, this species will be at once distinguished, by its much more elevated and differently formed glabella, as well as by its less convex lateral lobes, and the presence of a defined furrow between the lateral and the palpebral lobes. Its surface is also much less strongly and distinctly pustulose. This latter character, and its proportionally narrower neck segment, as well as its more conical middle lobe, readily distinguish it from *L. hibernicus*, of Portlock, which it more nearly resembles. It differs too distinctly from *L. Boltoni*, of the Niagara Group, to render a comparison necessary.

*Locality and position.* Alexander County, Illinois. Trenton division, Lower Silurian.

#### GENUS PROETUS, Steininger, 1830.

##### PROETUS ELLIPTICUS, M. & W.

Rather small, entire outline narrow elliptic. Cephalic shield about one-third wider than long, and slightly longer than the thorax,—semielliptic, regularly and rather narrowly rounded in front and straight behind, with postero-lateral angles produced into small spines, which extend back to the fourth thoracic segment; anterior and lateral borders with a narrow marginal rim, strongly deflected upwards, and separated from the cheek and glabella by a deep furrow. Glabella more prominent than the cheeks, including the neck segment, a little more than twice as long as wide, broader behind than in front, where it is regularly rounded, separated from the cheeks on each side by moderately well defined furrows; neck segment more prominent in the middle than any part of the glabella, about twice as wide (antero-posteriorly) as the thoracic segments, and defined by a narrower, but distinct neck furrow, the continuation of which becomes wider, but rather less sharply impressed, as it extends straight across the posterior margins of the cheeks to their lateral marginal furrows; lateral furrows of glabella, excepting the posterior ones, nearly obsolete; posterior lateral lobes small, subovate, and nearly isolated by the rather obscure lateral furrows just in front of each being directed obliquely backwards and inwards, so as to intersect the neck furrow; the other lateral lobes, of which there seems to be indications of two on each side, are very small and nearly obsolete, anterior lobe composing nearly half of the glabella. Eyes lunate, not oblique, one-third as long as the glabella, but not so prominent, situated less than their own length in advance of the posterior margin of the cheeks near the glabella, and about half their length from the lateral margins of the cheeks; reticulations very fine. Facial sutures intersecting the posterior margins of the cheeks near the middle, and extending forward from the anterior side of each eye, at first close to the side of the glabella, but soon curving outwards and obliquely forward, so as to intersect the lateral margins nearly opposite the anterior end of the glabella.

Thorax about one-third wider than long, distinctly trilobate; mesial lobe prominent, about once and a half as wide as the lateral lobe, consisting, apparently, of only eight segments; a little widest near the middle, and tapering posteriorly; segments not arching forward, but strongly arched upward, rather flattened. Lateral lobes depressed, somewhat flattened near the mesial lobe, and rounding down rather distinctly to the lateral margins; segments

narrow on their upper edges, flattened in the direction of the axis, and bent a little backwards below the knees, apparently rounded at the extremities.

Pygidium subsemicircular, but a little rounded at the anterior lateral angles; about one-third wider than long, and as long as the glabella, exclusive of the neck segment and anterior marginal rim; rather more broadly rounded behind than the anterior margin of the glabella; mesial lobe prominent, about as wide anteriorly as the lateral lobes, and tapering backwards to an obtuse point within the margin, where it ends rather abruptly and is a little depressed, but not flattened; consisting of nine or ten moderately defined segments; lateral lobes depressed below the mesial lobe, near which they are slightly flattened, thence rounding to the margins; each with about seven rather faintly defined segments, of which only the anterior one is marked with a longitudinal furrow, all extending to within a short distance of the margin, which seems to be slightly thickened.

Surface apparently nearly smooth excepting the glabella, which is covered with small, rather closely arranged granules. A row of very small granules may also be seen, by the aid of a magnifier, along the posterior margin of the segments of the mesial lobe, both of the thorax and pygidium.

Entire length, 0.78 inch; do. of pygidium, 0.23 inch; do. of thorax, 0.25 inch; do. of head, 0.30 inch. Breadth of head, 0.39 inch; do. of thorax, 0.36 inch; do. of pygidium, 0.34 inch. Length of glabella, including neck segment, 0.25 inch, exclusive of neck segment, 0.21 inch; length of eyes, 0.10 inch; distance of same in advance of posterior margin of cheeks, 0.06 inch.

At a first glance this species might be readily mistaken for *P. Swallowi*, of Dr. Shumard, from the same horizon. A more careful comparison, however, at once shows it to present well defined specific differences. In the first place, the outline of the anterior margin of its head is more regularly rounded, its entire cephalic shield longer in proportion to its breadth, while its postero-lateral angles are produced into small spines. Its glabella also differs in being a little narrower anteriorly than behind, instead of the reverse, and its sides straight instead of sinuous. The posterior lateral lobe of its glabella likewise differs in being entirely isolated by the furrow just in advance of it intersecting the neck furrow, and the other lateral furrows are less distinct than in *P. Swallowi*. Again, our species differs in having its glabella granulose, and the segments of its mesial lobe each provided with a row of minute marginal granules, instead of having "the whole surface minutely punctate."

It is very probable we should call this species *Phillipsia elliptica*, as it seems to present most of the characters of that genus. Unfortunately, the characters distinguishing these groups seem not to have been very clearly pointed out.

*Locality and position.* Jersey County, Illinois. Kinderhook Group, of Subcarboniferous series.

Genus PHILLIPSIA, Portlock, 1843.

Subgenus GRIFFITHIDES, Portlock, 1843.

PHILLIPSIA (GRIFFITHIDES) PORTLOCKII, M. & W.

Entire outline subovate. Cephalic shield subsemicircular, nearly twice as wide as long, moderately convex, rounded in front and straight behind, with the posterior lateral angles terminating in short, pointed, spine-like appendages extending back to the third thoracic segment. Glabella ovate, tumid, contracted and depressed behind, widest and most convex anteriorly, where it is about one-third narrower than its length from the neck segment to its rounded front, which is not margined by a projecting rim; very distinct from the cheeks in consequence of its greater convexity; posterior lateral lobes small, much depressed, and isolated by the oblique lateral furrows in front being so

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directed as to intersect the neck furrow; immediately in front of these there are, on each side, traces of another small, very obscurely defined, lateral lobe; anterior lobe ventricose, and composing much the larger portion of the whole. Neck furrow deep and broad; its continuation across the posterior side of the cheeks distinct, straight and terminating at the lateral furrows of the cheeks; neck segment prominent, twice the size of the thoracic segments, and equalling the greatest transverse diameter of the glabella in front, but more depressed. Eyes in the form of somewhat oval, ventricose tubercles, considerably lower than the glabella, from which they are separated by distinct depressions; placed about half their length in advance of the posterior margin of the cheeks, and without visible facets; palpebral lobes, depressed, not covering the eyes, but merely connecting with their inner sides, so as to leave the visual area forming an almost isolated tubercle. Cheeks sloping from the eyes into a broad, rather deep marginal sulcus, which is not continued around the front of the glabella, but extends back a little upon the lateral spine; outside of this there is a rather thick, distinctly striated marginal rim, which becomes very nearly obsolete around the front of the glabella. Facial sutures cutting the anterior margin nearly on a line with the eyes, but curving so as to leave a small semicircular wing on each anterior lateral margin of the glabella; intersecting the posterior margin of the cheeks about midway between the lateral angles and the neck segment.

Thorax nearly as long as the glabella, exclusive of the neck segment; distinctly trilobate; axial lobe slightly wider than the lateral lobes, rounded and rather prominent; its nine segments narrow and straight, or not arching forward. Lateral lobes more depressed, somewhat flattened on the inner and rounding down to the lateral margins; segments duplicated by a nearly mesial furrow extending from their inner ends out to, or a little beyond the undefined knee, beyond which they are obliquely flattened for folding together and rounding at their extremities.

Pygidium a little more than one-fourth wider than long, rather distinctly convex, rounded behind and more or less straight in front, with anterior lateral angles obliquely truncated and a little rounded. Mesial lobe very prominent and well defined, rounded above, and a little flattened or furrowed on the sides; as wide anteriorly as the lateral lobes, tapering and declining somewhat posteriorly to an abrupt, obtuse termination, about half its own greatest anterior breadth within the flattened margin; segments, fourteen or fifteen, distinctly defined, smaller than those of the thorax. Lateral lobes depressed below the mesial lobe, somewhat flattened on the inner side, and sloping to the rather narrow and more flattened border; segments ten, somewhat oblique, well defined for three-fourths of the distance out, and thence less distinctly so, to within a short distance of the margin; a few of the anterior ones with an obscure longitudinal furrow.

Surface granulose, the granules being largest on the posterior portions of the glabella, palpebral lobes and neck segment. On the segments of the axial lobe, both of the thorax and pygidium, as well as on those of the lateral lobes, they are very small and regularly disposed, so as to form a single row to each segment.

Entire length, 1.19 inches; about, 0.70 inch. Length of pygidium, 0.44 inch; breadth of do., 0.56 inch. Length of thorax, 0.33 inch; breadth of do. 0.60 inch. Length of cephalic shield, 0.42 inch; breadth of do. 0.64 inch. Length of glabella, exclusive of neck segment, 0.36 inch; breadth of do. 0.24 inch. Length of eyes, 0.13 inch.

This species is remarkable for the structure of its eyes, which, instead of being, as usual, covered by the palpebral lobes, have the form and appearance of distinct oval tubercles, with the palpebral lobes very small, depressed to, or a little below the elevation of the eyes, and merely connecting with their inner side. We have not been able to see any facets in the eyes, even under a good lens, but they doubtless existed beneath the external crust.

We know of no species with which it could be, for a moment, confounded. With the exception of the above mentioned peculiarities of the eyes, it agrees well with the characters of *Griffithides*, and doubtless must be called *Griffithides Portlockii*, if that group is to be retained as a distinct genus.

Named in honor of Col. J. E. Portlock, of the Royal Ordinance Survey, of Ireland, and author of the genus.

*Locality and position.* Warsaw, Illinois; Keokuk Limestone, of Subcarboniferous series.

PHILLIPSIA (GRIFFITHIDES) SCITULA, M. & W.

Small, entire outline nearly elliptical. Cephalic shield semielliptical, very convex, about one-third its breadth wider than long, rounded anteriorly, and nearly straight, or more or less concave in outline behind, with posterior lateral angles produced backwards into rather stout, carinated, pointed spines, which extend as far back as the fifth thoracic segment. Glabella broadly rounded and sloping in front, where it is destitute of a projecting marginal rim; distinctly contracted posteriorly, in which region it is most elevated; separated from the cheeks on each side by its much greater convexity, and a shallow furrow, which becomes obsolete around the front; posterior lateral lobes comparatively large, subtrigonal, very oblique, depressed and isolated by the strongly defined lateral furrows in front of them being so very oblique, and produced, as to intersect the neck furrow; midway between these two lobes there is a more prominent mesial node, isolated by an accessory furrow passing across in front of it, so as to cut it off, as it were, from the narrow posterior central part of the glabella; second and third lateral lobes very small, transverse and obscurely defined by short, nearly obsolete linear furrows; anterior lobe larger than all the remaining portions of the glabella between it and the neck furrow. Neck segment a little higher in the middle (where it is provided with a minute tubercle) than the glabella, strongly arched upwards, (not forward) and more than twice as wide, antero-posteriorly, as one of the thoracic segments; neck furrow deep, broad, and arching with the neck segment. Eyes comparatively large, or half as long, and (behind) nearly as prominent as any part of the glabella, located with their posterior margins opposite the neck furrow, and less than half their own length in advance of the posterior margins of the cheeks; visual surface ventricose, or subhemispherical, smooth, or even polished, as seen under a good pocket lens, but when examined by a high magnifying power, showing numerous, regularly disposed, minute lenses, beneath the smooth, transparent, outer crust; palpebral lobes semicircular, convex, and resting upon the eyes like lids. Cheeks as compared with the size of the eyes and glabella, small, sloping abruptly from the eyes into the deep, broad, marginal furrow, which becomes suddenly obsolete on reaching the anterior lateral margins of the glabella, and extends backwards to, or even a little upon the posterior lateral, subspiniferous appendages; posterior margins with an elevated rim, strongly defined by the deep continuation of the neck furrow; lateral margins showing, as seen from above, a narrow rim, which, in a side view, is seen to be deep, vertically flattened, and marked by fine parallel longitudinal striæ; anteriorly it continues around the front of the glabella, but does not project so as to be visible from above, while its upper margin is continued in the form of a carina along the middle of the posterior lateral spines to their points. Fascial sutures very nearly as in the last species.

Thorax nearly as long as the head, but somewhat narrower, very distinctly trilobate; mesial lobe prominent, rounded and a little wider than the lateral lobes; its nine segments narrow, and subangular. Lateral lobes depressed and flattened near the mesial lobe, and so abruptly sloping from the outer side of this flattened space as to impart a slight angularity along that region; segments corresponding in size with the segments of the mesial lobe, and

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distinctly kneed near the middle, outside of which they are bent down and obliquely flattened for folding together and rounded at the extremities.

Pygidium very convex, smaller than the cephalic shield, forming more than a semicircle, with the anterior lateral angles obliquely truncated; posterior outline regularly rounded, with a moderately wide, smooth, depressed, nearly flat, or sloping marginal zone; trilobation, as in the thorax, strongly defined; mesial lobe prominent, as wide anteriorly as one of the lateral lobes including its border, distinctly flattened on each side, slightly tapering to an obtuse termination, less than half its own greatest anterior breadth from the posterior edge, segments eleven or twelve, well defined above, but nearly obsolete on the flattened sides. Lateral lobes convex, but distinctly less so than the mesial lobe, horizontally flattened near the latter, with an angle along the outer margin of the flattened space, from which the sides slope abruptly to the flattened, smooth border; segments six, simple, bent down in the middle, very distinct, but terminating abruptly at the rather wide border; each with a minute pustule on the knee.

Surface of glabella and all the segments more or less granulose, the granules being larger on the posterior part of the glabella and neck segment than elsewhere.

Entire length, 0.60 inch. Length of pygidium, 0.19 inch; breadth of do. 0.27 inch; length of thorax, 0.18 inch; breadth of do. 0.28 inch; length of cephalic shield, 0.23 inch; breadth of do. 0.32 inch.

As near as can be determined by a description of the pygidium alone, this species would seem to be nearly related to *P. Cliftonensis*, of Shumard. The middle lobe of its pygidium, however, is proportionally wider than in that species, being as wide as one of the lateral lobes including the smooth border; while in *P. Cliftonensis* it is said to equal one of the lateral lobes exclusive of its border; in addition to this, Dr. S. makes no allusion to the flattened sides of this lobe, so characteristic of our species. We do not believe it always possible, however, to distinguish allied species of this genus from the pygidia alone, and hence, think it would be better if Palaeontologists would never propose a species without seeing also some of the other parts. At the same time that our species may be identical with that described by Dr. S., it is far more probable that if we could compare entire specimens of each, we would find them entirely distinct.

We know of no described species, the head of which could be confounded with this; its comparatively large convex eyes, and distinct mesial node between the posterior lateral lobes of the glabella, and the deep vertically flattened and striated lateral margins of its cheeks are marked characters, that will readily distinguish it. Whether the proposed genus *Griffithides* is to be retained as a genus or a subgenus, this must be included in it, since it has the posteriorly contracted glabella and smooth eyes of that type. We do not believe, however, that non-reticulated eyes in any type of *Trilobites* proves them to have been blind, for as in this case, they were doubtless always provided with minute lenses beneath a transparent outer crust.

*Locality and position.* Upper Coal Measures, Springfield, Illinois.

#### PHILLIPSIA (GRIFFITHIDES?) SANGAMONENSIS, M. & W.

Entire outline elongate subovate. Cephalic shield very convex, forming more than a semicircle, and about one-third wider than long; regularly rounded in front and straight behind, with posterior lateral angles produced into rather broad, carinated, pointed or subspinous appendages, equalling in length the distance from the posterior side of the cheeks to the anterior end of the eyes. Glabella ventricose, very prominent, separated from the cheeks on each side by a moderately distinct furrow, which also passes around the front; most convex behind the middle, thence rounding and declining to the rounded front, about one-fourth longer than wide, and slightly wider between

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the eyes than anteriorly; sides nearly parallel, but a little sinuous at the middle; posterior lateral lobes comparatively large, subtrigonal or tuberculiform, and entirely isolated by the distinct lateral furrows passing obliquely across with a backward curve, from opposite the middle of each eye, so as to intersect the neck furrow; second lateral lobes much smaller and more obscure than those behind, and also oblique, being merely defined by a faintly impressed, curved, oblique line; in advance of these there are also obscure indications of two other short, nearly obsolete lateral furrows, scarcely visible without a lens. Occipital segment well defined, but lower, and considerably shorter in its transverse diameter than the glabella; strongly arched upwards, (not forwards) and projecting backwards a little beyond the posterior line of the cheeks; neck furrow distinct and arching upward with the occipital or neck segment; its continuation along the posterior sides of the cheeks very deep, and nearly straight for about two-thirds of the way across towards the lateral margins, where it intersects another furrow or depression, coming around the sides of the cheeks. Eyes lunate, rather large, or nearly half as long as the glabella, exclusive of the neck segment, prominent, but not as high as the glabella, located about half their own length in front of the posterior margin of the cheeks; visual surface smooth, or even apparently polished, and showing no traces of lenses under a good magnifier; palpebral lobes convex, and not depressed, but resting like a lid upon the eyes. Cheeks subtrigonal, declining abruptly from the eyes; lateral margins turned downwards, and forming below a sharp edge, which continues back along the lower margin of the posterior spine-like appendages; above this there is a vertically flattened, or even concave zone or belt, extending from near the front part of the glabella around the outside of each cheek, and becoming a shallow furrow as it passes back upon the spines, along which it seems to be more or less marked nearly to their pointed extremities; between this vertically flattened band and the eyes, there is another nearly horizontally flattened, or outward sloping zone, extending around each cheek from near the front posteriorly, so as to unite with the lateral continuations of the neck furrow behind, and continue as a single furrow along the upper outer margin of the posterior spines, thus leaving a more or less defined mesial ridge between these two furrows, the entire length of the posterior lateral spiniferous appendages, as well as around the cheeks to near the front of the glabella; posterior margins of the cheeks, behind the continuations of the neck furrow, very prominent, or forming a thickened rim. Facial sutures extending obliquely forward and outward from the anterior side of the eyes, and again curving inwards, so as to cut the anterior margin nearly on a line with the anterior inner extremity of the eyes; from the posterior end of the eyes, directed obliquely outwards and backwards, so as to intersect the posterior margin nearly midway between the neck segment and the subspiniferous lateral posterior appendages.

Thorax only known from a few of the posterior segments, which show the mesial lobe to be wider and distinctly more prominent than the lateral lobes, which are flattened near the mesial lobe, and abruptly deflected downwards near the middle; segments divided by a furrow near the anterior side from the knee inwards, and flattened in the direction of the axis at the rounded outer extremities.

Pygidium semielliptic, slightly wider than long, and rather convex, distinctly narrower and a little longer than the cephalic shield, narrowing backwards and very narrowly rounded at the posterior extremity. Mesial lobe prominent, a little flattened on each side, and narrower than the lateral lobes, from which it is distinctly separated by broad, strong furrows; tapering gradually backwards, and terminating rather abruptly nearly one-third its own length from the posterior margin, so as to leave a broad, nearly flat, or more or less sloping, smooth border, which extends along each side the whole length of the pygidium, but becomes narrower anteriorly; segments of mesial lobe, eighteen, well defined, rounded and very nearly or quite straight. Late-

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ral lobes more depressed, and about one-third or one-fourth wider than the mesial lobe, rounding down rather abruptly to the lateral margins; segments nine or ten, rounded, simple and separated by distinct furrows; all terminating abruptly at the inner edge of the broad, smooth, marginal zone.

Entire surface apparently very nearly smooth.

Length of cephalic shield, exclusive of spiniferous appendages, 0.45 inch; breadth of same, 0.66 inch; height of do. 0.31 inch. Length of glabella, exclusive of neck segment and anterior border, 0.36 inch; breadth of same, across the posterior lateral lobes, 0.29 inch; do. of same across the constricted central region, 0.25 inch; do. of same anteriorly, 0.28 inch. Length of eyes, 0.18 inch; height of same behind, to top of palpebral lobes, 0.08 inch. Length of pygidium, 0.50 inch; breadth of same, 0.55 inch.

This species seems to combine the characters of *Phillipsia* and *Griffithides*, as usually understood, to such an extent as to apparently warrant Prof. Koninck's opinion that these two types can scarcely be regarded as constituting entirely distinct genera. In its somewhat swollen glabella and smooth eyes, it agrees with the characters assigned *Griffithides*, while in almost all its other characters, it corresponds to Portlock's definition of his genus *Phillipsia*. We know of no species with which it is liable to be confounded.

*Locality and position.* Springfield, Illinois. Upper Coal Measures.

NOTE.—In our paper published in the Proceedings of the Academy for Aug., 1865, p. 154, we proposed the name *Sphærocrinus* for a section of the genus *Actinocrinus*, of which our *A. concavus* is the type. Since that time, we observe Roemer had previously used the name *Sphærocrinus* for another group; hence we now propose for our type the name *Cælocrinus*.

December 12th.

The President, DR. BRIDGES, in the Chair.

Twenty-one members present.

The following paper was offered for publication:

"Second Contribution to the History of the Delphinidæ." By Prof. E. D. Cope.

Prof. E. D. Cope exhibited the skeleton of a seal which was shot near Cambridge, Maryland, on an arm of Chesapeake Bay, eighteen miles from salt water, by Mr. Daniel M. Henry. It was a species of *Cystophora*, or hooded seal, measured 6½ feet, and weighed, when living, about 330 lbs. The skin was not preserved, but the fur of the extremities was straw-colored. The nails very strong and extended much beyond the palmar integument in its dried state.

Whether this species is the *C. cristata* or *antillarum* can not be determined, owing to the imperfection of extant descriptions. The *cristata* has been taken as far south as New York.

DeKay, in his *Zoology*, mentions a seal recorded by Mitchill as having been taken high up the Chesapeake, near Elkton. It was probably the same as the present.

Prof. E. D. Cope also exhibited some specimens of crania of Cetaceans of our coast, and stated that the only species which could as yet be proven to belong to our fauna were the following:

- Balæna cisartica*, or Southern Right Whale.
- Megaptera osphyia*, The Humpbacked Whale.
- Orca*, sp., The Killer.
- Globicephalus intermedius*, or *melas*, The Black Fish.
- Beluga canadensis*, The White Whale.

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*Phocæna brachycium*, The Northern Porpoise.

*Delphinus clymene*, Dolphin.

———— *tursio*, Black Dolphin.

*Hyperodon semijunctus*, sp. nov., Southern Bottle nose.

The remaining species are as yet undetermined.

He also alluded to the existence of several species of White Whales, probably confounded hitherto, owing to their uniform coloration. Similar uniformity exists in various genera, as *Corvus*, *Chasmarhynchus*, etc. A species brought by Dr. I. I. Hayss, from Upernavik, was called *B. rhinodon*, and a large one presented by Dr. E. K. Kane was characterized under the name *B. concreta*.

Dr. I. I. Hayes stated that the two skulls, mentioned by Prof. Cope as belonging to the genus *Beluga*, brought by him from Greenland, were obtained from the Governor of Upernavik, as those of the White Whale. He also observed, that during his voyage he had seen the White Whale abundantly as far north as 78° N. lat.

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*December 19th.*

The President, DR. BRIDGES, in the Chair.

Twenty-nine members present.

Prof. E. D. Cope exhibited some large, fresh specimens of *Accipenser erotinus* Raf., *Scaphirhynchus platyrhynchus*, *Polyodon folium*, and *Bubalichthys taurus* from the Ohio. In regard to the geographical distribution of fishes, he alluded to the species of the streams of the low lands of late formation near the coast in New Jersey, Delaware, and southward, as being to a considerable extent different from those of the streams which descend through the rolling country which lies between this and the first ridges of the Alleghenies,—a distribution repeating points observed among the plants. The characteristic types are—

*Ambloplites pomotis*,

*Bryttus obesus*,

———— *chaetodon*,

*Apeltes quadracus*,

*Hololepis erochroüs*,

*Aphredodernus sayanus*,

*Melanura annulata*,

*Hybognathus procne*,

and certain species of *Cyprinodontidæ*. *Stilbius americanus* and *Moxostoma oblongum* find a most congenial habitat in these sluggish streams, though common species of the upper country; but the *Exoglossum*, *Rhinichthys*, *Semotilus*, (= *Ceratichthys*) are wanting, or very rare. *Esox reticulatus* is most especially abundant.

Of the list given, the *Hybognathus* occurs in still coves about dams in the hill country, and *Bryttus chaetodon*, he was informed by J. Burke, had been taken in a pond near Bristol, Pa., near the Delaware. Other than these he knew of no example of the above species occurring in the upper country.

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*December 26th.*

The President, DR. BRIDGES, in the Chair.

Twenty-three members present.

On report of the respective Committees, the following papers were ordered to be published:

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Observations on the Microscopic Shell Structure of *SPIRIFER CUSPIDATUS*,  
Sowerby, and some similar American forms.

BY F. B. MEEK.

In his valuable and accurately illustrated work on the British Carboniferous *Brachiopoda*, page 45, Mr. Davidson states that *Spirifer cuspidatus*, Sowerby, "belongs to the genus *Spirifer* proper, and not to the subgenus *Cyrtia*," as he and others had supposed. He also adds that "no specimen of *S. cuspidatus* I have hitherto been able to examine, has exhibited a deltidium in its entire condition, but which, in all probability, was not perforated by a circular foramen, as seen in true types of the subgenus *Cyrtia*." In a note at the bottom of the page containing his explanations of plate viii., however, of the same work, he corrects the above statement as follows: "At page 45, I stated that no specimen of *S. cuspidatus* I had hitherto been able to examine possessed its deltidium, and that I considered it was, in all probability, not perforated by a circular foramen, as in the true types of the subgenus *Cyrtia*. Subsequently, however, Mr. S. P. Woodward showed me the internal cast of the ventral valve of a specimen in the British Museum, thought to have belonged to *S. cuspidatus*, and derived from the Dolomitic carboniferous limestone of Bredon Hill, in which there is evidence that the deltidium was in reality perforated by a circular foramen as in *Cyrtia*." Of this internal cast, as well as of a gutta-percha mould made from it, Mr. Davidson gives good figures, on plate ix. (figs. 1 and 1a) of the work above cited.

From these remarks, and the accompanying figures, it seemed to be nearly or quite demonstrated, that *S. cuspidatus* is a true *Cyrtia*, as had formerly been supposed by Prof. McCoy and Mr. Davidson, and, as it is also the type upon which Sowerby had founded his older genus *Spirifer*, it would follow, as a matter of course, that *Cyrtia*, Dalman, could only be regarded as an exact synonym of the typical section of *Spirifer*, Sowerby, which view was adopted in the work on the Palæontology of the Upper Missouri, by the writer and Dr. Hayden. It will also be observed that the shell structure of *Spirifer* is there described as being impunctate, in accordance with the views of Dr. Carpenter and Mr. Davidson in regard to the group to which we propose to restrict it, after separating, generically, the punctate types *Spiriferina* and *Cyrtina*.

Some examinations I have recently had an opportunity to make, however, of the shell structure and internal characters of several American forms, closely allied to, if not in some instances identical with, *Spirifer cuspidatus*, as well as of a supposed authentic British example of that species, in the collection of Mr. Worthen, at Springfield, have given rise to doubts in regard to the correctness of some of these conclusions.

I was led to make these examinations by observing in Mr. Worthen's collection excellent specimens, apparently of *Spirifer capax*, Hall, (very similar to *S. cuspidatus*, Sowerby) from Clarksville, Missouri, showing exactly the form and internal characters of a genus *Syringothyris*, proposed by Prof. Winchell, in the Proceedings of the Academy for January, 1863. It will be remembered that Prof. W. described the type of this genus as having the form and general external characters of *Spirifer cuspidatus*, but differing in the possession of a curious internal tube connected with the inner side of a kind of deep-seated, false deltidium, or transverse plate passing across between the dental laminae. He also states that the shell structure is impunctate.

On examining the specimens above alluded to in Mr. Worthen's collection, I at once observed their exact agreement in all internal characters, as well as in the form, ornamentation, &c., with *Syringothyris*, but soon saw, while looking at them with a good pocket lens, some evidences of a punctate structure, and, on afterwards placing fragments of the shell under a high magnifier, where they could be examined by transmitted light, they were found to be beyond doubt *punctate*. Subsequently I mentioned this fact to Prof. Win-

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chell, at Chicago, and requested him to re-examine his typical specimens of *Syringothyris*, to see if he could discover any traces of punctures. He afterwards informed me that he had done so, but could see no evidences of punctures, and he kindly gave me a slip of glass upon which were fastened, with Canada balsam, fragments of his typical species and of another not yet described, in neither of which any punctures were visible.

In this connection, however, it is proper to remark, that all of these fragments are either very small, or so opaque and badly preserved, that the punctures might not be apparent, even if they exist. It is also worthy of note that in several shells of this type which I have examined, the punctures are very small, and so distant that fragments large enough to show clearly the punctures as seen in the various types of *Terebratulidæ*, might be without a single puncture. From these facts, and others to be mentioned farther on, I am strongly inclined to think Prof. Winchell's specimens are not in a good condition for showing the shell structure, and without intending to attribute any carelessness or want of discrimination to that gentleman, that these species may yet be found to be punctate when other specimens in a better state of preservation are obtained.

On looking farther through Mr. Worthen's collections, I saw other species of this type, and examined their shell structure with the following results: first, a form from Missouri, believed to be *Spirifer subcuspidatus*, Hall, from the Keokuk division of the subcarboniferous series, (and thought by Mr. Davidson, from an examination of examples from Illinois, to be identical with European forms referred to *S. cuspidatus*), was examined, and found to be unquestionably punctate. The punctures are small and scattering, but owing to the fact that they were, in the specimens examined, filled with dark opaque matter, they could be very clearly seen by transmitted light, in thin fragments saturated with Canada balsam. The interior of this shell is unknown to me.

Next, specimens of apparently another species or variety, (scarcely, if at all, distinguishable, by external characters at least, from certain forms of *S. cuspidatus* as usually understood), from the fine-grained sandstone of the Knobbs, back of Albany, Indiana, were examined, and also discovered to be clearly and unquestionably punctate, the punctures being small and scattering as in the last. Internal casts of this shell, from the same locality, show it to possess exactly the internal characters of *Syringothyris*, Winchell.

Having thus found the punctate structure clearly visible in the several American forms mentioned, a specimen of *S. cuspidatus*, sent by Mr. Davidson to Mr. Worthen from Millicent Island, was examined, and quite unexpectedly found to be also clearly punctate, like the American forms. This Irish specimen is not in a condition to show the interior, but on removing some of the matrix from the foramen it was found to possess, near the beak at least, the transverse plate, or deep-seated false deltidium, seen in *Syringothyris*, though it was impossible to determine, without spoiling the specimen, whether or not the characteristic tube exists in connection with its inner side.

Now when it is remembered that as careful, conscientious, and accurate an observer as Dr. Carpenter, has pronounced the structure of *Spirifer cuspidatus* impunctate,\* after a thorough examination, the question naturally suggests itself, whether there may not be two closely similar, but really very distinct, British types confounded under the single specific name *S. cuspidatus*? that is, one with a punctate structure and another without it. If so, and the punctate structure is here, as I am much inclined to believe, coincident with the pecu-

\*After speaking of the fact that Mr. Davidson had, on other grounds, divided the *Spirifer* group into sections, which it was also found could be distinguished by their shell structure, Dr. Carpenter remarks that "under the subgenus *Cyrtia*, he [Mr. Davidson] places these impunctate species, which, like *C. trapezoidalis*, have a perforation for the passage of a pedicle; besides these species I have examined *C. cuspidata*, [= *Spirifer cuspidatus*,] and am fully satisfied that in neither of these do any perforations exist." (*Davidson's Introduction to the Classification of the Brachiopoda*, p. 34.

lar internal characters of *Syringothyris*, it becomes a matter of some interest to know upon which of these types Sowerby formed the genus *Spirifer*. If it was upon the one with a punctate structure and an internal tube, then *Syringothyris* would apparently be an exact synonym of the genus *Spirifer*, which would differ from the ordinary types usually referred to that genus, such as *S. striatus* for instance, (= *Trigonotreta*, group of Kœnig,) as widely as the latter differs from *Spiriferina* and *Cyrtina*. If, on the contrary, Sowerby's type was an impunctate shell without the internal characters of *Syringothyris*, or in other words a *Trigonotreta*, then *Syringothyris* would stand as a distinct group, differing from *Spirifer* proper in as important characters as those distinguishing *Spiriferina* and *Cyrtina*.

Since seeing some of the internal casts of *Syringothyris*, in Mr. Worthen's collection, showing the peculiar appearances produced by the impressions left by the false deltidium and its attached internal tube, I have been struck with their similarity to the figures given by Mr. Davidson, (on plate ix. of his work already cited), of an internal cast of a supposed example of *S. cuspidatus*, thought to indicate the presence of a perforation through the deltidium. It is also worthy of note that Mr. Davidson refers this specimen to *S. cuspidatus* with doubt, and says it denotes the presence of a "tubular" perforation. Hence, I am very much inclined to the opinion that it rather indicates the internal characters of *Syringothyris*, than of an actual perforation through the deltidium, as in *Cyrtia*,\* and thus seems to sustain the view that there may be at least a part of the British specimens referred to *S. cuspidatus*, possessing the internal characters of *Syringothyris*. This opinion receives further support, too, from the fact that Prof. McCoy, in describing *S. cuspidatus* from Irish examples, says it has an "internal, deep-seated pseudo-deltidium, without perforation, leaving only an opening at its base."

It is to be hoped that those who may have duplicate authentic British examples of *Spirifer cuspidatus*, may be induced to make sections across the beak of the ventral valve, with the view of ascertaining whether or not any of them have the internal tube of *Syringothyris*, and if so, to ascertain whether the punctate structure is coincident with the presence of this internal appendage.

It may be proper to repeat here, for the information of those who may be disposed to make such observations, that in all of these shells I have examined, the punctures are very small, scattering and not arranged with the regularity seen in most types of *Terebratulidæ*, or in *Cyrtina*, *Spiriferina*, &c. Where they happen, as is often the case, to be filled with matter of the same color and translucency as the fibers composing the shell, it is exceedingly difficult to see them. When very small fragments only are examined, they may likewise be readily overlooked, as the fragment may contain but one or two of them, in which case they might not attract attention. Where they are filled, however, with dark or opaque matter, and a fragment, say 0.03 of an inch or more in diameter, is examined with a moderately low power, they are very distinctly seen, and cannot be for a moment mistaken for any appearance produced by a merely accidental cause.

NOTE.—It may not be out of place to add here, that the writer and Mr. Worthen have ascertained that the Coal-measure species, *Spirifer hemiplicatus*, (Hall,) is a distinctly punctate shell, and that it has not the internal characters of *Spirifer* or *Spiriferina*, but those of *Orthis*, excepting that there are in the ventral valve three prominent, very closely approximate, and nearly parallel laminae, extending from the beak forward to near the middle of the valve. Hence we regard it as the type of a new group, probably a section of the genus *Orthis*, for which we have in MSS. proposed the name *Syntrilasma*, M. & W.

\*It is not improbable, however, that the tube in *Syringothyris* may have sometimes, in young shell, been connected with an external opening through the deltidium, though none of the specimens I have seen shows such an opening.

## Second Contribution to a History of the DELPHINIDÆ.

BY E. D. COPE.

*Beluga rhinodon*, sp. nov.

Dr. Isaac I. Hayes brought, from his last Arctic expedition, the skeletons of two evidently different species of White Whales. These, with another in the Academy's Museum, brought by Dr. E. K. Kane, I enumerated as specimens of the common *Beluga catodon*, in my "First Contribution to the History of the Delphinidæ," but subsequently, after a thorough study, I was compelled to believe they had belonged to as many species, and recorded them as such at a meeting of the Academy, (*vide* Proceedings, 1865, p. 274.) After a study of more extended material, I have come to the conclusion that the genus of White Whales, like that of *Corvus*, *Quiscalus*, etc., is represented by several species of similar color. This view is consistent with our knowledge of its distribution throughout all the Arctic seas, and the great numbers in which they occur on the coasts of all Arctic regions. At present I give briefly the diagnostic characters of four species, premising that I have not at present means of determining the full characters of two,—*Beluga vermontana*, Thompson, and *Beluga kingii*, Gray. The present species comes under section

- a. Cervical vertebræ distinct; no vertebral canal; dorsals and ribs ten; acromion recurved.

Muzzle short, to notch equal from notch to supraoccipital crest; exposed preareal part of maxillaries extending to opposite notch. Palatines barely in contact; vomer well developed behind them. No tubercular process on first rib. Teeth 4—6.

*Beluga catodon*, auctorum.

Muzzle to notch one-half of whole cranium; exposed portion of maxillaries half way to notch; palatines much in contact; vomer scarcely developed behind; first rib with an elongate tubercular process. Teeth "8—8 to 10—10."

- aa. Cervical vertebræ distinct, no vertebral canal; dorsals and ribs eleven; acromion decurved.

*Beluga declivia*, sp. nov.

Muzzle to notch half length of cranium; exposed portion of maxillaries half way to notch; palatines widely separated; vomer well developed behind them; first rib with an elongate tubercular process. Teeth 9—10.

- aaa. Axis and third vertebra ankylosed by centrum and diapophyses, latter perforate for vertebral artery; dorsals and ribs eleven; acromion recurved.

*Beluga concreta*, sp. nov.

Muzzle to notch half total length of cranium; exposed portion of maxillaries half way to notch; palatines largely in contact; vomer little developed behind them. No tubercular process on first rib. Teeth 6—7.

In the *declivia* and *concreta* the neural spine of the axis is steeply tectiform and keeled; in the *catodon* and *rhinodon* very flat. The diapophyses of the seventh cervical are longer and more recurved in the *rhinodon* than in the others.

The length of the skeleton of the *rhinodon* is 7 feet 10½ inches; of the *concreta* 13 feet 2½ inches. The former, and that of the *catodon*, are from Upernavik; those of the *concreta* and *declivia* were obtained by Dr. Kane; the last is in the Museum Comparative Zoology, Cambridge, Mass.

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The White Whale of the St. Lawrence, *Delphinus canadensis* of Desmarest, figured roughly after Duhamel, by Gray, (*Zool. Erebus and Terror*), and recently described by Prof. Jeffries Wyman in the *Proc. Bost. Society Nat. History*, is distinct from the preceding species. In all of them there is a strong postero-inferior medial process of the atlas, not seen in Dr. Wyman's figures, and in none is the odontoid process prolonged or elevated; his figure represents a deeper (thicker) axis, and more elevated atlas than any of the preceding possess. The rudimental dorsal fin and auricular meatus do not exist in the true *catodon*, (syn. *B. albicans*), carefully described by Barclay and Neill in the *Wernerian Transactions*, 1817, (the former represented by a ridge only;) nor do Pallas and others allude to a dorsal fin, as observed by Dr. Wyman. The complete vertebral canal of the third cervical vertebra is, perhaps, also a character. In a specimen ten feet in length, the seven cervicals measured seven inches, which is the length given for those of a *catodon* of fourteen feet.

The *Beluga canadensis* must be included in the fauna of the United States, though not included in the published New York or Massachusetts faunæ. Josselyn states, page 105 of "An account of two voyages to New England, (1673)," "The sea hare is as big as a grampus or herring-hog, and as white as a sheet. There hath been some of them at Black Point Harbour, Maine, and some way up the river, but we could never take any of them; several shot slugs at them, but lost their labour." Verrill, in his *Catalogue of the Mammals*, observed at Anticosti in the summer of 1861,\* does not enumerate this species. He notes two species of *Megaptera*, which is probably the first record of the *Megaptera osphya*, (*Proc. Acad.*, 1865, 178.)

#### *Phocæna brachycium*.

Two specimens (Nos. 105-6) from the Museum of the Essex Institute at Salem, Mass., which has lent me, through Fredk. W. Putnam, Director,† numerous specimens of Cetaceans, represent this species. It is found in the harbor of that port, and is called the "Puffing Pig."

As compared with the *P. communis*, the muzzle is less acuminate and elevated on the median line; the maxillaries are flatter, oblique, and not descending vertically to the alveolar border. The triangle is more elevated, and not flat, medially, and extends to beyond the posterior fourth of the dental series. The premaxillary knobs are strongly developed, and their posterior acumination does not extend behind the middle of the margin of the nareal opening. Nasals with a curved concavity and external prominence. The squamosal bone, occipital process, and sphenoid border are much plicated. The points of insertion of the muscles on the basioccipital bone are situate one opposite each condyle, instead of on a median longitudinal ridge. A very small triangular surface of the vomer reaches the palatine plane, giving its posterior border little of that W-shaped outline produced in the *P. communis* by the large development of the vomer. The pterygoids are broader than in the same species, nor prolonged so far posteriorly.

The distance from the coronoid process to the angle of the mandible enters  $3\frac{1}{2}$  times into the length of the ramus; its middle is measured by the lower part of the condyle. The alveolar border is half the length of the ramus to the coronoid process.

The sella turcica is but little depressed, and the corpus olivare little elevated. The bony falk is well developed near the foramen magnum, but rapidly diminishes superiorly; no tentorium. There is a lateral fontanelle on the supraoccipital of one specimen, none on the other.

\* *Proc. Bost. Soc. N. H.*, 1862, 135.

† Not Secretary, as accidentally mentioned in my first "Contribution."

	106		105	
	Inch.	Line.	Inch.	Line.
Length from end muzzle to convexity of occipital condyle.....	11...	1·2.....	11...	4
Length from end muzzle to basal notch.....	4...	6.....	4...	7·6
"    "    "    nares.....	5...	7·2.....	5...	8
"    "    "    supraoccipital crest.....	8...	10·4.....	8...	10·8
"    of ramus mandibuli.....	8...	0.....	7...	9
Breadth at middle of alveolar border.....	1...	11·4.....	1...	9·2
"    notch.....	2...	9·6.....	2...	10
"    middle of orbits.....	5...	0·4.....	4...	7·8
"    temporal crests.....	5...	0·5.....	4...	10·5
"    of blow holes.....	1...	3.....	1...	2
"    premaxillary knobs.....	1...	6·8.....	1...	5·4
"    premaxillaries at middle muzzle.....	0...	10·5.....	0...	11
"    palatines anteriorly.....	1...	11.....	1...	9
"    angles of mandible.....	4...	8·6.....	4...	9
Length of upper tooth line.....	3...	6·3.....	3...	9·2
"    gonys.....	1...	0.....	0...	9·8
Depth of ramus at middle tooth line.....	0...	8·4.....	0...	7·2
Teeth.....		25		24
		24		21

The os hyoides has somewhat the form of a caudal fluke. The anterior extremity is grooved below; the hæmal apophyses are broader than the body, convex exteriorly, thin on the edges, and tapering to a very small articular extremity. Length of body 1 inch 5·8 lines. Extent of apophyses 3 inches 8·6 lines.

Prof. Wyman states,\* that in "the porpoise," probably following Cuvier, the seven cervical vertebræ are ankylosed. Hunter states of the *Phocæna communis* that the four anterior only are united.

#### *Hyperodon semijunctus*, sp. nov.

The question as to whether a *Hyperodon* exists on this side the Atlantic, has at length been solved by the description which I have received through Dr. Alexander Wilcocks of this city, of a species taken in Charleston Harbor. This is well drawn up by Gabriel Manigault, who set up the specimen, which adorns the Charleston Museum. The points wherein it evidently differs from its congeners, the *H. bidens* and *latifrons*, are, first, the separation of the four posterior cervical vertebræ, the three anterior only being solidly ankylosed, instead of the seven, as in the known species, even in the young, according to Dr. J. E. Gray. Second, the possession of one or more pair of ribs added to the flying series, and of two more vertebræ, including ten dorsals instead of nine.† Five ribs are connected with the sternum, of which the anterior articulates with the seventh cervical by its inferior head.

I extract the following from Gabr. Manigault's description:

"The superior maxillary bones are quite pointed in front and widen out towards the base of the snout. Their lateral edges become developed on each side into a prominent vertical ridge, which is slightly convex on the outer surface, and the reverse on the inner. These bones, after having widened out upon approaching the orbits, ascend vertically along with the occipital (the two together holding the frontal, which is quite perceptible, between them.) and form at the back of the head a transverse ridge, which is quite high and very thick. From my not knowing by what name it was

\* Journ. East. Soc. N. Hist., 1833, p. 669.

† Nine are given by Cuvier, *Ossemens Fossiles*, viii. 188; and Flower, *Proc. Zool. Soc., Lond.*, 1866, 419.



known, I did not satisfy myself concerning the presence of palatine tubercles. Another peculiarity of the head consists in the lower maxillary bones being provided, each at its point with a single small and very sharp tooth. These were not noticed during the dissection, owing to their being too much imbedded in the integuments; they are now, however, quite visible. In the cavity of the skull is a septum of bone separating the cerebrum from the cerebellum, (i. e. the tentorium.) The first rib is very wide and short, and presents a marked contrast to the others. The sternum is quite flat and wide. The pectoral fins are small, and have been carefully preserved, with the various carpal and phalangeal bones kept together by their natural ligaments. As the skeleton stands, the fins consist only of the scapula, the humerus, the radius, and the ulna, with but few phalanges.

"The length of this specimen is between twelve and thirteen feet."

*Delphinus erebennus*, sp. nov.

This species has been noticed, Proc. Academy, 1865, p. 199, as the *D. tursio*, though sundry differences were there enumerated, and the possibility of its distinctness pointed out. The only specimen at that time in the Academy's possession was the skeleton of a young animal. Since then, the institution has been presented with a skeleton of a very old individual by Dr. Howell of this city, who obtained the animal some years since from a fisherman's seine at Red Bank, below opposite this city. Like a usual form of the *tursio*, the species is probably entirely black, but smaller, and possessed of several less ribs and dorsal vertebræ. The skeletons of the American species agree in the following formula: C. 7. D. 11. L. 16. C. 4 to 8 to last neural spine. The first perforated caudal is two vertebræ anterior in the older, to that of the younger specimen. The separate vertebræ resemble those figured by Cuvier (*Ossemens Fossiles*) except the 12th caudal. It is doubtful, however, whether the latter represents the *tursio*, as the vertebral formula differs much from that recorded by Hunter, (*Philos. Trans.*, 1787, 383,) which must probably be regarded as the type, (*vide* Gray, *Cat. Brit. Mus.*,) as follows: C. 7. D. 18. L. and C. 37.

The acromion in the *erebennus* is short, and broadly truncate. In the small processes of the cervical vertebræ the two specimens differ much, the larger being much the more unlike the *tursio*. Their position is elevated opposite the middle of the centra, and two of them have a weak connection with the superior process, forming a vertebral canal. The diapophysis of the atlas is short. As in the *tursio*, this vertebra and the axis are ankylosed. The abbreviation of the sternum, apparent in the young specimen, is borne out by the adult. All the original segments are abbreviated, but especially the posterior, which is not more than one-third the length given in Cuvier's figure of the *tursio*; it is joined at much shorter distances by the same number of hæmapophyses—five. In this specimen it is singularly unsymmetrical; the animal exhibits numerous exostoses, and a synostosis of the body and processes of two of the lumbar vertebræ.

This species has been also mentioned by Prof. Wyman as the *tursio*.

The length of the specimen presented by Dr. Howell is seven feet and a half. The teeth are truncated as in the adult *tursio*.

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The Annual Reports of the Recording Secretary and Curators were read, as follows:

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## REPORT OF THE RECORDING SECRETARY,

For 1865.

During the year ending November 30th, 1865, there have been elected twenty-five members and seven correspondents.

The deaths of the following members and correspondents have been announced.

Members.—Dr. Thos. B. Wilson, Major Chas. Izard Macenen, Dr. Wm. Dar-rach, Fernando de la Cuesta, Wm. Parker Foulke, Jos. Hopkinson, Surgeon U. S. V., Jas. Dundas, J. Reese Fry, Richard Price, Jacob R. Smith, Joseph D. Brown, Dr. Francis M. Moore.

At the Annual Meeting, the following additional were announced: Dr. W. M. Uhler, Rev. Dr. Ducachet.

Correspondents: Dr. R. M. S. Jackson, Wm. Jackson Hooker, Chas. J. Wister, Wm. F. Lynch.

One member has resigned.

The number of papers contributed and ordered to be published, during the same time, has been fifty-one, as follows:

E. D. Cope, seven; Isaac Lea, LL. D., 3; John Cassin, 4; F. W. Lewis, M. D., 1; A. Günther, 1; Geo. W. Tryon, Jr., 1; Geo. N. Lawrence, 2; F. B. Meek and A. H. Worthen, 5; Philip P. Carpenter, 1; Theo. Gill, 7; Timothy A. Conrad, 3; Alex. Winchell, 1; C. A. Helmuth, M. D., 1; John L. Le Conte, M. D., 4; Horatio C. Wood, Jr., M. D., 1; Harrison Allen, M. D., 1.

The resignation of Prof. Rand, from the office of Recording Secretary, hav-ing been tendered, it was accepted at the October business meeting, and Dr. H. C. Wood, Jr., was elected in his stead.

Chap. III., Art. VII., of the By-Laws, has been amended, by striking out the second clause, viz.: "but correspondents residing in the United States shall be charged with a diploma fee of five dollars.

Chap. III., Art. IV., has been amended by striking out the word "all," and substituting therefor "three-fourths of," and adding at the end of the Article the words "not less than fifteen members being present.

All of which is respectfully submitted.

HORATIO C. WOOD, Jr.,  
*Recording Secretary.*

## REPORT OF THE CURATORS,

For 1865.

The Curators respectfully present their usual Annual Report, for the year just about closing, on the condition of the Building and Museum of the Academy, committed to their supervision and care. They have to regret, in the commencement, to represent their charge, in some degree, in an unfavor-able aspect. The collections in natural history, during a series of years, have increased with such rapidity, and have accumulated to such an extent, that they have outgrown the proper capacity of the building, and we find ourselves exceedingly cramped to accommodate the incessant additions. Further than this, three departments, which comprise the most destructible objects of natural history, have become so extensive, that we can no longer command the voluntary labor of members and committees sufficient and essential to keep them in proper order and preservation. The large and magnificent collection of birds is actually suffering from the want of atten-tion, and must inevitably be destroyed if further neglected; and the same may be said of the entomological cabinet, the herbarium, and, indeed, of all the perishable collections.

To preserve the ornithological cabinet, it has become absolutely necessary that the Curators should be authorized to employ the services of a compe-

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tent person to attend to it at the earliest possible moment. This can be done at the rate of one hundred dollars monthly, and would, in the course of a year, ensure the temporary preservation of the collection. The matter is so important, that we hope the Academy may feel disposed to take some immediate action on it, even with the apprehension of future pecuniary embarrassment.

In relation to other perishable departments of our Museum, the Curators have recently taken steps by which they expect to be temporarily enabled to ensure their safety; but we feel it to be of the greatest necessity that, at an early period, the Academy should attempt to make permanent arrangements by which all departments of the Museum may be properly arranged and preserved.

We would further urge upon the Academy the importance of looking forward to procure more ample accommodation for its ever-growing Museum and Library; and, indeed, we now feel greatly the want of at least double our present space. A new building, two or three times the size of the one we now occupy, together with a lecture-room capable of seating about five hundred persons, and several minor conveniences, would greatly aid the views of the Academy, and render it far more useful to the interests of science, and of the community in which we live.

The accompanying list exhibits the contributions to the Museum of the Academy in its various departments during the year 1865.

*Mammals and Birds.*—Three species of the former and ten species of the latter, together with fifty species of birds' eggs, were presented by the Chicago Academy of Sciences.

*Reptiles and Fishes.*—Of the former, Prof. E. D. Cope presented 30 specimens of 7 species of batrachians, and of the latter, 319 specimens of 70 species. Three reptiles and ten fishes were presented by Messrs. C. Guillou, T. Norris, W. M. Cauley, and Dr. J. M. Corse.

*Mollusks.*—Four hundred species of shells of Mazatlan and Cape St. Lucas were purchased. Eight hundred species of shells, of which about 300 were new to the Cabinet of the Academy, chiefly from the collection of the Wilkes' Exploring Expedition, were presented by the Smithsonian Institution. Mr. G. W. Tryon, Jr., presented 164 species of shells, mostly new to our Cabinet; Dr. Isaac Lea, 24 species; and J. H. Thomson, 32 species. Six other species were presented by Messrs. H. F. Picking, B. Oman, and Dr. Semple.

*Articulates.*—Twenty-seven species of myriapods and spiders were presented by the Smithsonian Institution, H. C. Wood, E. D. Cope, and M. Miles.

*Fossils.*—A small collection of New Jersey Cretaceous Fossils, a collection of 93 species from the Upper Missouri, and a collection from the Wilkes' Exploring Expedition, were presented by the Smithsonian Institution. Col. H. Romanowsky presented 36 species from Russia, and small collections and specimens were presented by Dr. J. Letterman, U. S. A., W. S. Vaux, P. Tarbé, J. P. Lesley, F. Klett, Dr. J. L. Burt, W. Anderson, J. G. Thayer, W. L. Mactier, R. Glover, J. H. Slack, A. Du Bois, G. J. Scattergood, and J. Da Costa.

*Minerals.*—Forty-two specimens were presented by Dr. I. Lea, W. S. Vaux, J. C. Trautwine, P. W. Sheaffer, A. Du Bois, B. A. Hoopes, E. A. Souder, F. Klett, W. J. Vinal, J. B. Ware, Dr. Semple, and H. S. Stellwagen.

*Botany.*—John Warner presented 200 species of Alpine plants, and several species were presented by Messrs. Garnett and T. E. Ridgway.

*Comparative Anatomy.*—Two mounted skeletons were presented by G. E. Manigault, of Charleston, and three by Dr. J. M. Corse. Miscellaneous specimens were presented by F. Klett and Dr. Leidy.

Respectfully submitted by  
JOSEPH LEIDY,  
Chairman of the Curators.

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## REPORT OF THE COMMITTEE ON CONCHOLOGY,

For 1865.

To the Curators of the Academy of Natural Sciences:

*Gentlemen*,—During the present year the Conchological collection has been increased by the addition of about 1400 species (4000 specimens) of which more than one half are new to us.

Among these donations, two deserve especial notice, viz. :

1st. A collection of 400 species from Mazatlan and Cape St. Lucas. These are named by Mr. Philip P. Carpenter, and the collection is extremely valuable to us, from the fact that this gentleman has devoted many years to the special study of the Mollusca of our Pacific Coast.

A small portion of this collection was purchased by the Academy, but most of the species were generously presented by Mr. Carpenter, who, in many cases, has contributed the only duplicates of rare species from his own cabinet.

2d. We have received from the Smithsonian Institution over 800 species of shells collected by Wilkes' Exploring Expedition. These shells have all been labelled by the late Mr. Hugh Cuming, after comparison with the types in his own collection. Among them are a number of types of new species described by Dr. A. A. Gould, in his "Report on the Mollusca of the Expedition."

With great satisfaction the Committee announce to you that, with a few trifling exceptions, they have during the present year completed the labelling and arrangement of the entire Conchological Collection. The task has been an arduous one; over 7000 labels have been written, and corresponding entries made in the Catalogue during the year.

In almost every instance it has been necessary to determine the species by reference to the Library of the Academy. The splendid donations of shells made by the late Dr. T. B. Wilson, were accompanied by loose numbers referring to catalogues drawn up by eminent London Conchologists; in the confusion attending the removal of our collection when the last addition was made to our building, nearly all of these numbers were so displaced as to be useless. This confusion, (certainly unavoidable, as the Academy has never possessed adequate means to ensure the proper care of its collections) is deeply to be regretted, as the Committee have been compelled to substitute their own instead of the original more authentic labels. The Academy has not recently been able to continue to supply its library with Conchological works, which has increased our difficulties.

When Dr. Wilson's collections were presented to the Academy, they contained about 400 new species. These were not published in England until several years afterwards, and if we had possessed the means to have them immediately labelled and exhibited, we would doubtless have published most of them in our Proceedings, and thus received a large portion of the renown which has attached to an European Journal among Conchologists.

The Cabinet now contains upwards of 13,000 species, and is the largest in America.

Having no published Catalogue of our collection and its duplicates, a necessary basis for extensive exchanges, the Committee have effected very little in this way. There is probably no other department of the Museum possessing such numerous duplicates, so that the collection could be greatly enlarged by exchanges.

The systematic classification of the shells was, until this year, chiefly Lamarckian, but the Committee have substituted for this the more scientific arrangement of recent systematists. At present the marine shells are classified according to the system of Messrs. H. and A. Adams, with modifications; the terrestrial shells according to that of Dr. Louis Pfeiffer, and the Unionids and fresh water Gasteropods to those of Messrs. Lea, Binney and Tryon. The

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## ELECTIONS FOR 1865.

The following persons were elected Members,—viz. :

- Jan. 31.*—Eckley Coxe.  
*Feb. 28.*—Jas. C. Thompson, Chas. Kinsman.  
*April 25.*—Jos. W. Drexel.  
*May 30.*—J. B. McCreary, Henry Bryant, M. D.  
*June 27.*—Edward Browning.  
*July 25.*—Lt. Gen'l. Ulysses S. Grant, Maj. Gen. Geo. C. Meade.  
*Aug. 29.*—Benj. Smith Lyman, Henry Winsor, Chas. F. Parker.  
*Sept. 26.*—Vincent Barnard, A. Hugel, John Brady, John B. Wood.  
*Oct. 31.*—Dr. J. H. McQuillen, John M. Maris.  
*Dec. 5.*—Newbold H. Trotter, Frederick Klett, S. Emlen Randolph,  
 Alfred B. Taylor, E. Dieffenbaugh, Isaac Burk.  
*Dec. 26.*—Jas. H. Orne.

The following were elected Correspondents :

- Jan. 31.*—Rev. Ovide Brunet, of Quebec.  
*Feb. 28.*—Chas. Stodder, of Boston.  
*May 30.*—Wm. Theo. Roepper, of Bethlehem, Pa.  
*June 27.*—Leo Lesquereux, of Columbus, Ohio.  
*Aug. 29.*—Lient. Col. Hennadius Romanowsky, of St. Petersburg,  
 Russia.  
*Sept. 26.*—P. D. Knieskern, M. D., of Shark River Village, N. J.  
*Dec. 5.*—Lewis H. Morgan, of Rochester, N. Y.; Prof. Durieu de  
 Maisonneuve, of Bordeaux, France.  
*Dec. 26.*—Augustus R. Groté, of New York; Thos. Kite, of Cin-  
 cinnati, Ohio.

## CORRESPONDENCE OF THE ACADEMY,

For 1865.

Letters were received and read as follows :

*January 3d.*—Natural History Society in Emden, Oct. 25th, 1864, advising of their proposed celebration of their 50th anniversary on the 29th of December, 1864, and inviting the members of the Academy thereto.

The Royal Academy of Sciences of Madrid, Nov. 16th, 1864, acknowledging the receipt of the publications of the Academy.

*January 17th.*—A. Boivin, Paris, May 23d, 1864, acknowledging his election as correspondent.

*February 7th.*—Baron Osten-Sacken, New York, Feb. 1st, 1865, in regard to exchange with the Natural History Society in connection with the University of Moscow.

*February 21st.*—Maximilian, Prince de Weid, Nieuwied, Feb. 5th, 1865, acknowledging his election as correspondent.

Theo. Gill, on a correction to a paper published in the last number of the Proceedings.

*March 14th.*—Royal Asiatic Society, London, July 20th, 1864;

Natural History Society of East Altenburg, July 26th, 1864; transmitting their publications and acknowledging the receipt of those of the Academy.

The Imperial Academy of Sciences, Moscow, June 15th, 1864;

The Natural History Society of Freiburg, Oct. 20th, 1864;

The Royal Swedish Academy of Sciences, Stockholm, Nov. 16th, 1864; transmitting their publications.

Royal Horticultural Society, London, Oct. 26th, 1864;

Imperial Academy of Sciences, Vienna, Oct. 4th, 1864; acknowledging the receipt of the publications of the Academy.

*March 21st.*—Imperial Leopold Carolus Academy, Dresden, Nov. 28th, 1864;

Geological Survey of India, Calcutta, July 11th, 1864; severally transmitting their publications.

The Essex Institute, Salem, Mass., Feb. 25th, 1865, acknowledging the receipt of the Proceedings.

Society of Natural Sciences of Wurtemberg, Nov. 15th, 1864, acknowledging the receipt of the Proceedings and requesting a supply of deficiencies.

Office of the Geological Survey of Sweden, Stockholm, Nov. 1st, 1864, transmitting donations to the Library and desiring exchange.

Natural History Society, Nurmberg, June 15th, 1864, transmitting donations to the Library.

*April 4th.*—Smithsonian Institution, March 27th, 1865, accompanying a donation to the Museum.

*April 11th.*—Baron Von Osten-Sacken, New York, March 21st, 1865, transmitting publications of the Entomological Society of St. Petersburg, and desiring exchange.

Theo. Gill, Washington, April 8th, 1865, desiring to withdraw his note of Feb. 21st.

*May 9th.*—Royal Society, Edinburg, Jan. 4th, 1865;  
Royal Library, Munich, Sept. 27th, 1864;  
Royal Academy of Sciences, &c., Bruxelles, Sept. 15th, and Oct. 1st, 1864;  
Imperial Geological Society, Vienna, Sept. 26th, 1864; severally acknowledging the receipt of the publications of the Academy.

The Natural History Society, Riga, Dec. 1864, transmitting a donation to the Library.

Royal Society of Sciences, Gottingen, Feb., 1865;  
Royal Prussian Academy of Sciences, Nov. 30th, 1864; severally transmitting their publications and acknowledging the receipt of those of the Academy.

*May 16th.*—Linnean Society, Bordeaux, Jan. 2d, 1865, accompanying donation.

Royal Academy, Belgium, Sept. 1863;  
Royal Academy, Lisbon, March 22d, 1865;  
Smithsonian Institution, Oct. 11th, and July 18th, 1864, severally acknowledging the receipt of the publications of the Academy.

Chas. Stoddart, Boston, May 11th, 1865, acknowledging his election as correspondent.

*May 23d.*—Imperial Academy of Sciences of Vienna, Feb. 1st, 1865, transmitting a donation to the Library.

The Lyceum of Natural History, New York, May 15th, 1865, acknowledging the receipt of the Proceedings of the Academy.

*June 13th.*—Philosophical and Literary Society of Leeds, May 26th, 1865, acknowledging receipt of deficiencies in the Academy's publications.

*June 20th.*—W. T. Roepper, Bethlehem, Pa., June 13th, 1865, acknowledging his election as correspondent.

Smithsonian Institution, Dec. 12th, 1864;  
German Geological Society, Berlin, Nov. 8th, 1864;  
Imperial Society of Naturalists, Moscow, Feb. 26th, 1865;  
Natural History Society, Augsburg, Oct. 10th, 1864; acknowledging the receipt of the publications of the Academy.

Society of Physics and Natural History, Geneva, Feb. 1st, 1865;  
Natural History Society, Görlitz, Feb. 28th, 1865; transmitting their publications and acknowledging the receipt of those of the Academy.

Natural History Society, Brünn, Dec. 12th, 1865, transmitting its publications and desiring exchange.

Natural History Society, Montreal, June 15th, 1865, asking a supply of deficiencies.

*July 18th.*—Prof. Jos. Henry, July 10th, accompanying donations to the Herbarium.

Royal Academy of Sciences, Madrid, acknowledging the receipt of the Proceedings.

Natural History Society, Hannover, accompanying their publications.

*August 1st.*—British Museum, London, acknowledging the receipt of the Proceedings of the Academy.

*August 15th.*—Albany Institute, acknowledging the receipt of the Proceedings.

*September 5th.*—Messrs. Meek and Worthen, Aug. 29th, 1865, in regard to their paper adopted at the last business meeting of the Academy.

*September 12th.*—Linnean Society, Lyons, Oct. 20th, 1864, and June 15th, 1865;

Catholic University, Louvain, Jan. 15th, 1865;

Asiatic Society of Bengal, March 23d, 1865;



Royal Academy of Sciences, Madrid, April 28th, and May 3d, 1865;  
Imperial Academy of Sciences, &c., Lyons, Oct. 30th, 1864; severally accompanying donations to the Library.

Museum of Bergen, Norway, April 24th, 1865, acknowledging receipt of the Proceedings.

Natural History Society of Prussian Rheinlands and Westphalia, March 3d, 1865, acknowledging the receipt of the Proceedings and Journal.

Microscopical Society, London, May 11th, 1865, in reply to a letter concerning deficiencies and acknowledging receipt of Proceedings.

Royal Horticultural Society of South Kensington, May 25th, 1865, in reply to a letter concerning deficiencies and accompanying donation to Library.

Public Museum of Buenos Ayres;

Natural History Society, Hannover, Feb. 15th, 1865;

Council of Improvement annexed to the Royal Technicological Institute of Palermo, dated July 29th, 1865, accompanying donations to the Library and asking exchange.

*October 3d.*—Lyceum of Natural History, New York, Sept. 11th, 1865, acknowledging the receipt of the Proceedings of the Academy.

*October 17th.*—Dr. G. Hartlaub, Bremen, Sept. 21st, 1865;

India Office Library, Westminster, Sept. 27th, 1865; each asking supply of deficiencies.

*October 24th.*—Albany Institute, Oct. 16th, acknowledging the receipt of the Proceedings.

Secretaries of the House of Bishops and of the House of Clerical and Lay Deputies of the Protestant Episcopal Convention, Oct. 19th and 20th, acknowledging the invitation to visit the Museum of the Academy and returning thanks therefor.

*November 14th.*—Swiss Society for the General Natural Sciences of Berne;

Natural History Society of Berne, Dec. 6th, 1864; acknowledging receipt of Proceedings.

Royal Asiatic Society, June 19th, 1865;

Royal Academy of Sciences, &c., Padua, June 15th, 1865; acknowledging receipt of Proceedings and accompanying donations to the Library.

Society of Natural Sciences in Wurtemberg, Stuttgart, June 1st, 1865, acknowledging receipt of Proceedings, asking supply of deficiencies and accompanying donation to Library.

Natural History Society, Emden, Aug. 1st, 1865, accompanying donations to the Library.

Natural History Society, Danzig, May 8th, 1865, accompanying donation to Library.

Lyceum of Natural History of New York, Oct. 23d, 1865, acknowledging receipt of the Proceedings.

*December 5th.*—Dr. Robert Bridges, declining re-election to the office of President of the Academy.

*December 19th.*—Prof. Leo Lesquereux, Nov. 25, 1865, acknowledging his election as correspondent.

Imperiale Institute of France, Nov. 6th, 1865;

Royal Academy of Sciences of Madrid, acknowledging receipt of Proceedings.

## DONATIONS TO THE MUSEUM.

1865.

- Anderson, Wm. *Sept. 12th.* Fossil vertebrae of a whale. York River, Va.  
Burt, Dr. J. L. *July 11th.* Two Mercenaria, from the Miocene, 390 feet from the surface at Fort Monroe.  
Canby, W. M. *Sept. 5th.* Two fishes from Isle of Shoals, N. H.  
Chicago Academy of Sciences. *Feb. 14th.* Three species of Mammals, 10 species of Birds, and about 50 species of Birds' Eggs.  
Cope, E. D. *June 20th.* Two species of Myriapoda. *July 11th.* Thirty specimens of 7 species of Batrachia, 319 specimens, 70 species of Fishes; from Western Pennsylvania, Michigan and Europe.  
Corse, Dr. Jas. M. *Dec. 19th.* Skeleton of the Codfish, Alligator and Dog-Mounted Bull-frog.  
Da Costa, J. *Feb. 14th.* Tooth of Oxyrhina. Mullica Hill, N. J.  
Du Bois, A. *March 7th.* Three specimens of Auriferous Pyrites, 1 Auriferous Quartz, Calcedony, Fossil Wood and Fossil Coral. From South Park, Colorado.  
Garnett, Mr., U. S. N. *June 6th.* Male flowers of a species of Palm from South America, through Dr. Greenbank.  
Glover, Ridgway. *Oct. 3d.* Fossil Trionyx Fragment. Camden Co., N. J.  
Guillon, C. Mr. *May 23d.* Four Viviparous Fishes from California, and a specimen of Stalactical Lava, from a Lava cave of Sandwich Isles.  
Hamlin, Dr. A. C. *Dec. 19th.* Large mass of Sulphuret of Copper. From Ducktown Mines, Tenn.  
Hoopes, B. A. *Feb. 14th.* Native Copper, Lake Superior.  
Klett, Frederick. *Oct. 10th.* Pyrotine from Vermont. Six specimens of oolitic phosphates of lime and alumina, and a fossil coral from the Island of Navassa. Some human bones and stone axes from a guano deposit at the depth of eight inches. From the Island of Orchilla, W. I.  
Lea, Isaac. *Feb. 21st.* Phlogopite, St. Lawrence Co., N. Y., do. Jefferson Co., N. Y. Steatite, Chester Co., Pa. Octohedral Iron, Chester Co., Pa. Staurolite, Del. Co., Pa. *March 14th.* Marmolite, 2 Lithomarge, Arragonite, Actinolite, Melanite, Carbonate of Lime, Blue Quartz and Cubical Pyrites from Chester Co., Pa. Anthracite from Calcareous Sandrock, Little Falls, N. Y. *May 16th.* Twenty-one species of Fresh Water Shells, types. *May 23d.* Specimens of Mica from Delaware Co., and Quartz and Clinocllore from Chester Co. *Nov. 14th.* Cyanite and Asbestos with Actinolite from Chester Co., Necronite from Newcastle, Del. *Nov. 21st.* Lymnæa Pingellii, L. Groenlandica, L. Apicana from Greenland and St. Lawrence River.  
Leidy, Dr. Jos. *Sept. 19th.* Lampugus punctulatus. *Nov. 21st.* Lymnæa oleacea, L. lanceata, L. catascopium, from Lake Superior.  
Lesley, J. P. *Nov. 14th.* A collection of Devonian Fossils. From Gaspé Bay at the mouth of the St. Lawrence River.  
Letterman, Dr. Jona. *Feb. 14th.* Tooth of Mastodon.  
Oman, Benj. *Sept. 12th.* Specimens of Hyalea from Newport, R. I.  
Mactier, Wm. L. *Sept. 12th.* Five specimens of fossils from the limestone formation near the Ottawa River, 20 miles from Montreal, Ca.  
Manigault, Gabriel E. *June 20th.* Finely mounted skeleton of a Monkey of South America, and an Owl.  
Miles, Prof. Manly. *June 20th.* Four species of Myriapoda.  
Newton, Mr. *April 11th.* Large Spider from Brazil.  
Norris, Thaddeus. *Oct. 24th.* Leiostomus obliquus, Caranx defensor and Labrax pallidus. From Newport, R. I.

- Picking, Lieut. H. F. *Aug. 15th.* Loligo.
- Powel, S. *May 16th.* Foraminiferous Sand, Newport, R. I.
- Reptiles and Insects, a collection of, *June 6th.*
- Bidgeway, Dr. T. E. *July 11th.* Fruit, leaves and woods of Sequoia gigantea, California.
- Romanowsky, H. *June 13th.* Thirty-six species of Jurassic, Oretaceous, Devonian and Silurian Fossils from Russia.
- Ruschenberger, Dr. W. S. W. *June 13th.* Specimens of Vellela from the Pacific Ocean.
- Semple, Dr. *Sept. 19th.* Specimens of Sombrero Guano. Chiton from Sombrero.
- Scattergood, Geo. J. *May 16th.* Vertebrae of Hyposaurus Rogersii from White Horse, Camden Co., N. J.
- Sheafer, P. W. *Feb. 14th.* Anthracite Coal, Sullivan Co., Pa.
- Shells, four hundred species from Mazatlan and Cape St. Lucas. Purchased by the Academy.
- Slack, Dr. J. H. *Nov. 21st.* Cardium Spillmani from Monmouth Co., N. J.
- Smithsonian Institution. *May 9th.* A collection of marine shells of about 800 species, of which 300 are new to the Museum of the Academy, principally from the collection of Wilkes' Exploring Expedition. *May 23d.* A collection of Fossils from the Marl of New Jersey, obtained by F. B. Meek. A collection of Fossils, of the U. S. Exploring Expedition, from Oregon and Australia, types of Dana's Geology of the U. S. Exploring Expedition. A collection of 93 species of fossils from the Upper Missouri, collected by Lieut. Warren and Dr. Hayden. *June 20th.* Fifteen species of Myriapoda.
- Souder, Edward A. *Oct. 3d.* Cryolite from Ivigtut, Arksuk Fiord, Greenland.
- Stellwagen, H. S. *Sept. 5th.* Sculptured fragment of marble from Baalbec.
- Tarbé, Prosper. *May 23d.* A small collection of tertiary fossils from Anteuil, France.
- Thayer, Jas. G. *Sept. 12th.* Large slab of stone with fossil plant.
- Thomson, J. H. *Dec. 19th.* Thirty-two species of terrestrial shells from Tahiti.
- Trautwine, J. C. *Jan. 3d.* Earthy Vivianite. Allentown, N. J.
- Tryon, Geo. W. *May 16th.* Nineteen species of fresh water shells, types. Sixty-six species of land and marine shells new to the collection. *Oct. 3d.* Sixty-five species of land and fresh water shells. *Nov. 21st.* Nineteen species of land and fresh water shells, principally from Syria and Algiers. Two Serpents from Hilton Head. *Sept. 12th.*
- Vaux, Wm. S. *Nov. 21st.* Fine large specimen of Rutile from Lancaster Co., Pa. *Dec. 5th.* A collection of fossils from Oriskany Sandstone of Muncy Hills, Pa. Skeleton of a small species of Ichthyosaurus, a vertebra of a large species of Ichthyosaurus, series of five vertebrae of do., three bones of do., large coprolite, vertebra of Plesiosaurus. Jaws of an Ichthyosaurus, dorsal spine of Hybodus reticulatus, two fishes, a Nautilus and a fragment of fossil wood. From the Lias of England. A fossil shell from Syria.
- Vinal, W. J. *Oct. 3d.* Sal Ammoniac on anthracite from Mauch-chunk.
- Ware, Maj. J. B. *July 11th.* Two specimens of Auriferous Pyrites. Colorado Territory.
- Warner, John. *Jan. 3d.* Two hundred species of alpine plants from the vicinity of Zermatt, Switzerland.
- Wilcocks, Dr. Alex. *June 20th.* Skeleton of a Hawk. Deposited.
- Wilson, Rathmell. *May 9th.* A small collection of woods and geological specimens. Presented by Mr. Rathmell Wilson, Executor of the Estate of Dr. T. B. Wilson.
- Wood, Dr. H. C. *June 20th.* Five species of Myriapoda.
- Woolman, Jas. *May 16th.* Fire Clay from Plainville.

## DONATIONS TO THE LIBRARY.

1865.

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### JOURNALS AND PERIODICALS.

#### DENMARK.

Christiania. *Forhandlingar i Videnskabs—Selskabet. Aar., 1863.*  
Copenhagen. *Videnskabilge Meddelelser fra den naturhistoriske Forening i Kjobenhavn. 1863. From the Society.*

#### HOLLAND.

- Stockholm. *Öfversigt af K. Vetenskaps Akademiens Forhandlingar. Tjugonde Argangen. 1863, Nos. 1—10. 1864. From the Society.*
- Altenburg. *Mittheilungen aus dem Osterlande. 16 Band, 4es Heft. 1864. From the Society.*
- Berlin. *Zeitschrift für die Gesammten Naturwissenschaften. Jahrg., 1863. Band 22, 1863. From the Society.*
- Archiv für Naturgeschichte. 29 Jahrg., 6es Heft to 31 Jshrg., 2es Heft. From the Editor.*
- Wochenschrift des Vereines zur Beforderung des Gartenbaues. Nos. 30, 1864, to 30, 1865. From the Society.*
- Zeitschrift der Deutschen Geologischen Gesellschaft. 16 Band, 3 and 4 Hefes; 17 Band, 1es Heft. From the Society.*
- Berliner Entomologischer Zeitschrift. 8er Jahrg., 3es and 4es Hefes, 9er Jahrg. Vierteljahresheft. From the Berlin Entomological Society.*
- Physikalische und Mathematische Abhandlungen der K. Akademie der Wissenschaften. Aus dem Jahre., 1863. From the Society.*
- Sitzungsberichte, of the same. From 48 Band, 5 Heft, to 50 Band, 2 Heft. From the Society.*
- Verzeichniss der Abhandlungen Gelehrter Gesellschaft, &c., in der Bibliothek der K. P. Akademie der Wissenschaften. 1864. From the Society.*
- Monatsberichte der K. P. Akad. der Wissen. 1864. From the Society.*
- Bonn. *Verhandlungen des Naturhistorische Vereines der Preus. Rheinlands und Westphalens. 21er Jahrg., 2es Heft. From the Society.*
- Bremen. *VIII. Jahres-Bericht des Instituts für Schwedische Heil-Gymnastik in Bremen. 1865. From the Director.*
- Danzig. *Schriften der Naturforschenden Gesellschaft. Neue Folge. 1en Band, 1es and 2es Hefes. From the Society.*
- Darmstadt. *Notisblatt des Vereins für Erdkunde und verwandte Wissenschaften. III. Folge, III. Heft. 1864. From the Society.*
- Dresden. *Novorum Actorum Academiæ Cæsareæ Leopoldino-Carolinæ Germanicæ Naturæ Curiosorum. Tome 31. From the Society.*

- Emden.** Neunundvierzigster und fünfzigster Jahresberichtes der Naturforschenden Gesellschaft. 1863. From the Society.
- Erlangen.** Jahresbericht über die Fortschritte in der Biologie im Jahres. 1843—1853. Herausg. von Dr. Canstatt und Dr. Eisenmann. Four Vols. 1844—1853. From the Library Fund.
- Frankfurt-am-main.** Der Zoologische Garten. 5er Jahrg., Nos. 7—12; 6er Jahrg., Nos. 1—6. 1865. From the Editors.
- Freiburg.** Berichte über die Verhandlungen der Naturforschenden Gesellschaft zu Freiburg. Band, III.; Heft, II. 1864. From the Society.
- Giessen.** Untersuchungen zur Naturlehre des Menschen und der Thiere. 9 Band, 6es Heft. From the Library Fund.
- Göttingen.** Nachrichten von der K. Gesellschaft der Wissenschaften und der Georg-Augusta-Universität ans dem Jahre 1864. From the Society.
- Gorlitz.** Abhandlungen der Naturforschenden Gesellschaft. 12er Band. From the Society.
- Halle.** Abhandlungen der Naturforschenden Gesellschaft. 9en Bandes, 1es Heft. From the Society.
- Hannover.** Vierzehnter Jahresbericht der Naturhistorischen Gesellschaft. 1865. From the Society.
- Leipzig.** Jahrbuch für wissenschaftliche Botanik. 4er Band, 2es Heft. From the Executors of the late Dr. Wilson.
- Munich.** Sitzungsberichte der K. B. Akademie der Wissenschaften. 1863, II., Heft, II., to 1864, II., Heft, II. From the Society.  
Annalen der K. Sternwarte. 13er Band, and 4er Supplement band. 1863—64. From the Society.  
Abhandlungen der Philos.-Philol. Class der K. B. Akademie der Wissenschaften. 10en Band, 1es Abth. From the Society.
- Neubrandenburg.** Archiv des Vereins der Freunde der Naturgeschichte in Meklenburg. 18 Jahrg. From the Society.
- Nürnberg.** Abhandlungen der Naturhistorischen Gesellschaft zu Nürnberg, III. Band, Hälfte. 1864. From the Society.
- Offenbach-am-Main.** Fünfter Bericht des Offenbacher Vereins für Naturkunde. 1864. From the Society.
- Regensburg.** Abhandlungen des Zoologisch-Mineralogischen Vereines in Regensburg. Neuntes Heft. 1864. From the Society.  
Correspondenz-Blatt of the same. 28 Jahrg. From the Society.
- Stettin.** Entomologische Zeitung. 1864. 25er Jahrg. From the Entomological Society of Stettin.  
Amtlicher Bericht über die 38te Versammlung Deutscher Naturforscher und Ärzte. Sept., 1863. From the Society.
- Stuttgart.** Neues Jahrbuch für Mineralogie, Geologie und Paläontologie. Jahrg., 1864, 6es and 7es Heft. From the Editors.  
Württembergische Naturwissenschaftliche Jahreshefte. 19 er Jahrg., 2es und 3es Heft; 20er Jahrg., 1es, 2es and 3es Heft. 21 Jahrg., 1es Heft. 1863—64—65. From the Editors.
- Vienna.** Jahrbuch der K. K. Geologischen Reichsanstalt. 1864. 14 Band, No. 3, to 15 Band, No. 2. From the Society.  
Denkschriften der K. Akademie der Wissenschaften. Math-Naturw. Classe. 23er Band. From the Society.  
Wiener Entomologische Monatschrift. Band VIII. From the Editors.  
Verhandlungen der K. K. Zoologisch-botanischen Gesellschaft. XIV. Band. 1864. From the Society.
- Würzburg.** Würzburger Naturwissenschaftliche Zeitschrift. Vierter Band, II., to 5er Band, 4es Heft. 1864. From the Physikalische Medicinischen Gesellschaft.

## SWITZERLAND.

- Basel. Verhandlungen der Naturforschenden Gesellschaft. 4er Theil, 1es Heft. From the Society.
- Geneva. Bibliothéque Universelle. Archives des Sciences Physiques et Naturelles. Nouvelle Periode. Tome 21, No. 83, to Tome 24, No. 93. Also Tome 9, No. 35; Tome 10me, Nos. 38—40; Tome 11me, Nos. 41—44; Tome 16me, No. 61. From the Editors.
- Mémoires de la Société de Physique et D'Histoire Naturelle. Tome 17, 2d Partie. From the Society.
- Lausanne. Bulletin de la Société Vaudoise des Sciences Naturelles. Tome VIII., Bulletins 51 and 52. From the Society.
- Neuchâtel. Bulletin de la Société des Sciences Naturelles. Tome 6me, 3me Cahier.

## RUSSIA.

- St. Petersburg. Bulletin de L'Académie Imperiale des Sciences. Tome 5, No. 6, to Tome 7, No. 2. From the Academy.
- Memoirs of the Same. Tome 5, No. 2, to Tome 6, No. 12. From the Academy.
- Horæ Societatis Entomologicæ Rossicæ. Fasc. Primus et secundus. 1863. From the Society.
- Moscow. Bulletin de la Société Imperiale des Naturalistes de Moscou. 1863 and 1864. From the Society.

## BELGIUM.

- Bruxelles. Mémoires Couronnés et autres Mémoires publiés par L'Académie Royale des Sciences, &c., de Belgique. Collection in 8vo. Tome 15, 4to, Tome 31. From the Society.
- Mémoires of the Same. Tome 34. From the Society.
- Bulletin of the Same. Tomes 15—17. From the Society.
- Annuaire of the Same. 30me Année. From the Society.
- Louvain. Annuaire de l'Université Catholique de Louvain. Année Bissextile. 1864. 28me Année. From the University.
- Sixteen Religious Theses. From the Same.

## FRANCE.

- Angers. Mémoires de la Société Académique de Maine et Loire. 3me to 6me Volume. From the Society.
- Bordeaux. Mémoires de la Société des Sciences physiques et naturelles. Tome III., 1er Cahier. 1864. From the Society.
- Actes de l'Académie Imp. des Sciences, &c. 3e Serie, 1864. 1er to 4me. Trimestres. From the Society.
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